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DINAMAP™

Adult/Pediatric Vital Signs Monitor

Service Manual

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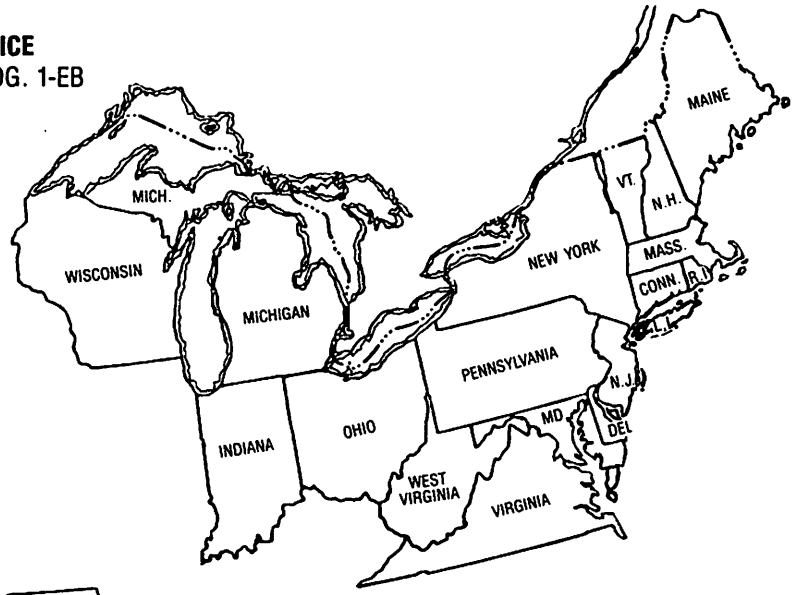

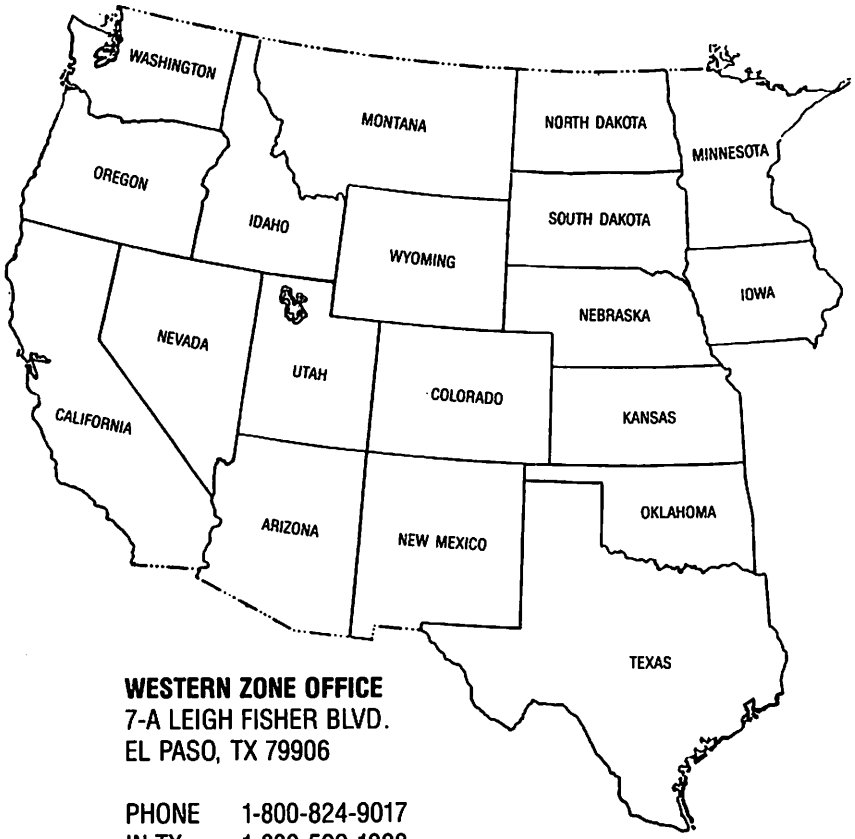

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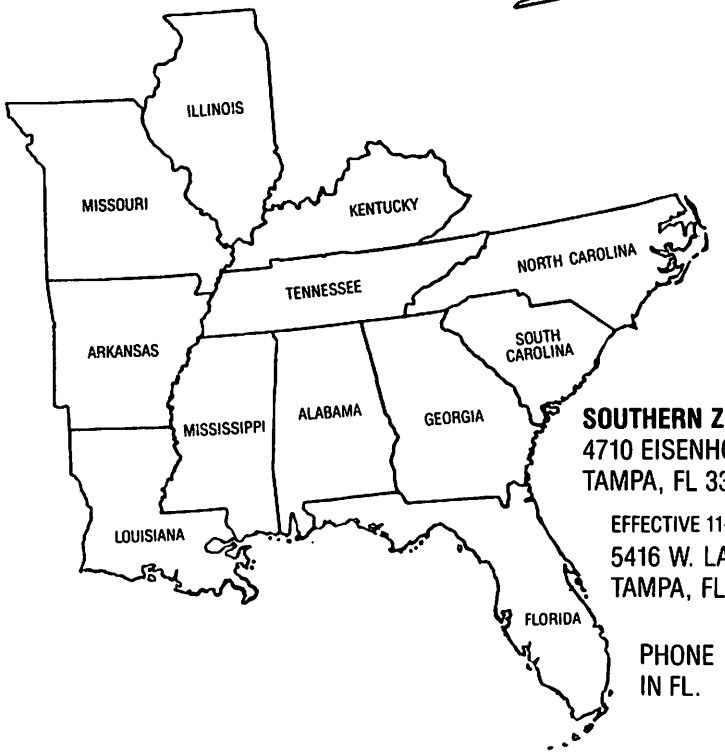

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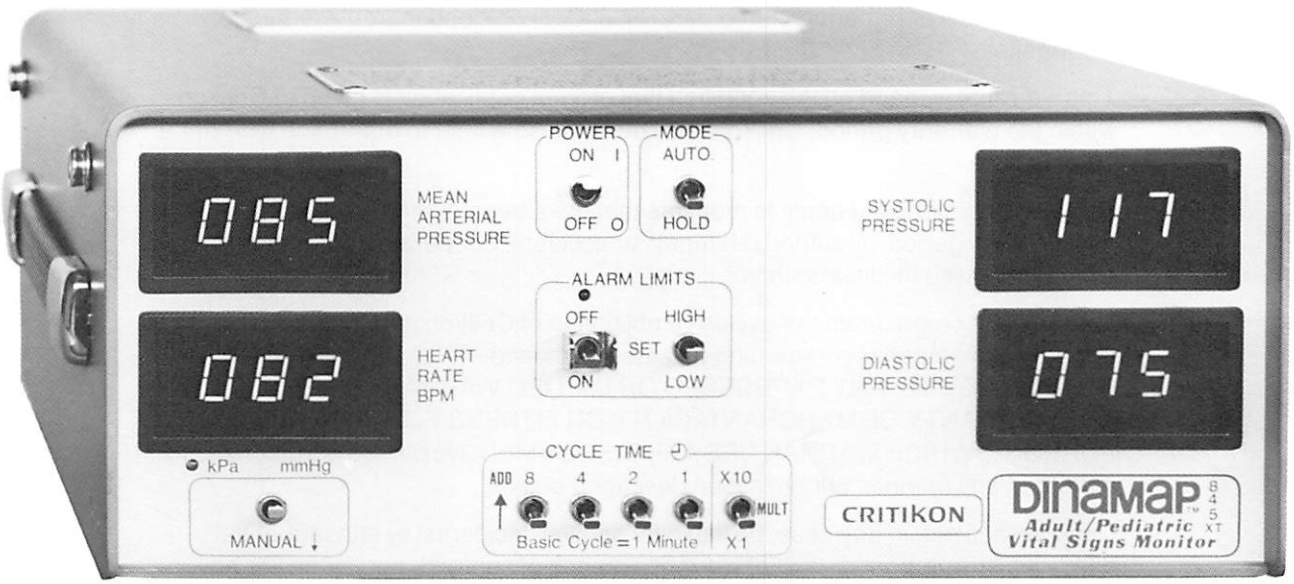
FIELD SERVICE

1986 SERVICE LOCATIONS



DINAMAP™ Adult/Pediatric Vital Signs Monitor

WARRANTY

CRITIKON, INC. ("Critikon") warrants to the purchaser that the DINAMAP™ Vital Signs Monitor, exclusive of expendable parts and other accessories, shall be free from defects in material and workmanship for a period of one year from the date of purchase. Critikon's sole obligation with respect to any such defect, is limited to the repair with new or remanufactured parts or, at Critikon's option, replacement of the monitor.

This warranty is made on the condition that prompt notification is given to Critikon within the warranty period. Critikon shall have the sole right to determine whether a defect exists.

This warranty does not apply to monitors that have been altered, subjected to misuse, negligence, unauthorized repair, or accident, or operated other than in accordance with the instructions.

This warranty represents the exclusive obligation of Critikon and the exclusive remedy of the purchaser regarding defects in a monitor. THIS WARRANTY IS GIVEN IN LIEU OF ANY EXPRESSED OR IMPLIED WARRANTIES, INCLUDING THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WHICH WARRANTIES ARE DISCLAIMED. No person is authorized to modify, in any manner, our obligation described above.

Critikon shall not, in any case, be liable for special, incidental or consequential damages arising from breach of warranty, breach of contract, negligence or any other legal theory.

SECTION 1
INTRODUCTION

1.1 GENERAL

The DINAMAP™ Adult/Pediatric Vital Signs Monitor is designed to monitor,noninvasively and automatically, systolic and diastolic pressure, mean arterial pressure (MAP), and heart rate using the oscillometric technique. The DINAMAP™ Monitor is programmed so that the user can select the pressure determination frequency in one minute increments or by manual intervention. The results of the most recent determination are displayed on the front panel until a new determination is completed. Adaptive internal programs reject most artifacts and compensate automatically for a wide range of patient variables.

The DINAMAP™ Monitor is effective and versatile. It continues monitoring during most clinical crises when other indirect measurement methods may fail. It can be used in any hospital area where critical care is administered, for example, emergency room, operating room, recovery room, intensive care unit, cardiac care unit, renal dialysis unit, burn centers, etc.

1.2 PURPOSE OF THE MANUAL

This service manual contains service and repair information for the DINAMAP™ Adult/Pediatric Vital Signs Monitor, Models 845(A), 845XT, and 845XT—IEC. The information contained in this service manual is directed to qualified service personnel. To aid servicing, technical personnel should have a thorough understanding of the appropriate operation manual.

References to the DINAMAP™ Monitor implies the information is common to Models 845(A), 845XT, and 845XT—IEC. Information specific to particular models is so noted.

DINAMAP™ Monitor Model 845(A) was improved by the addition of the X10 cycle time selection function, which increased the time select from 16 minutes to 160 minutes. This improved model is designated 845XT (extra time). To conform to the International Electrotechnical Commission (IEC) code 601, the Model 845XT was modified to the Model 845XT—IEC. This service manual describes the different configurations of the DINAMAP™ Monitor. Table 1 describes the major differences between models.

Information contained in this manual is directed to qualified service personnel. *To aid servicing, technical personnel should have a thorough understanding of the DINAMAP™ Adult/Pediatric Vital Signs Monitor Operation Manual.*

All repairs to this instrument should be referred to qualified service personnel.

1.3 MANUAL CHANGES

If in the normal use of this manual, errors, omissions, or incorrect data are noted, please complete the Publications Change Request Form in the back of this manual. Submit the form to:

Marketing Services
Critikon, Inc.
4110 George Road
Tampa, Florida 33614

Changes to this manual, either in response to user inputs or to continuing product improvements, will be accomplished through reprinting. Changes occurring between printings will be addressed through change information sheets and replacement pages. If a change information sheet does not accompany your manual, it is correct as printed.

1.4 RELATED PUBLICATIONS

1.4.1 INSTRUCTION CARD

Along with the monitor, the user will receive a laminated instruction card. This card contains a synopsis of the operating instructions, illustrations of the recommended control settings for typical operating cycles, and a troubleshooting table that addresses common malfunctions, probable causes, and recommended user responses.

1.4.2 OPERATION MANUAL

In addition to the instruction card, the user receives the appropriate operation manual, which contains instructions for use, operating parameters, and verifying performance and other user-related information aimed at familiarizing the user with the applications and use of the DINAMAP™ Monitor.

1.5 SERVICE POLICY

All repairs on products under warranty must be performed by Critikon personnel. *Unauthorized repairs will void the warranty.* Products out of warranty should be repaired by qualified electronics personnel.

TABLE 1. DINAMAP™ MONITOR CONFIGURATIONS

845(A)	845XT	845XT—IEC
SELECT FUNCTION MANUAL READ Switch By momentarily lifting up this switch the user can select the readings to display in either kPa or mmHg. Pressing momentarily this switch initiates a determination cycle during the wait period. **Printer:** Pressing and holding this switch for approximately 4 seconds initiates a header printout on a Critikon Trend Recorder/Printer, if it is connected to the monitor.	**MANUAL Switch** **Manual:** Pressing this switch while in the AUTO/HOLD mode, initiates a determination. **Printer:** Pressing and holding this switch for approximately 4 seconds initiates a header printout on a Critikon Trend Recorder/Printer, if it is connected to the monitor. **Cal:** First depress and hold this switch; then turn the power ON to access the Calibrate mode. (Refer to Section 8, Calibration.)	**MANUAL Switch** Same as 845XT
(kPa/mmHg) Select Function See above. Selection (mmHg or kPa) is indicated by the yellow LED on the front panel.	**kPa/mmHg Select** A selector plug is located internally on the Quad Display Board at the rear lower left corner. If the selector plug is removed from U9, rotated 180 degrees, and reinstalled, the opposite mode will be selected. Selection is indicated by the yellow LED on the front panel.	**kPa/mmHg Select** A Select Function switch is located internally on the Quad Display Board at the front lower left corner. When in the DOWN position, the readings display in mmHg. When in the UP position, readings display in kPa. Selection is indicated by the yellow LED on the front panel.
MODE Switch AUTO/CAL In AUTO, the monitor cycles automatically based on user-selected time delays. Moving the switch from AUTO to CAL during a determination cycle will not affect the cycle; the monitor will complete its cycle and shift to the CAL mode at the end of the wait period. Moving from CAL to AUTO will cause the monitor to initiate automatic determinations. In CAL, the air pump is disabled. (See Section 8, Calibration.)	**MODE Switch** AUTO/HOLD In AUTO, the monitor cycles automatically based on the cycle time selected. Moving this switch from AUTO to HOLD during a determination aborts the determination cycle and the cuff deflates. In HOLD, the determination cycle can be initiated by pressing the MANUAL switch. Moving the MODE switch from HOLD to AUTO causes a new determination to be initiated.	**MODE Switch** AUTO/HOLD Same as 845XT

TABLE 1. DINAMAP™ MODEL CONFIGURATIONS (Cont'd)

845(A)	845XT	845XT—IEC
ADD MINUTES Switches Allows the user to select a determination cycle from one to 16 minutes.	**CYCLE TIME Switches** Allows the user to select a determination cycle of from one to 160 minutes.	**CYCLE TIME Switches** Same as 845XT
Power Connection Domestic: Yellow cord, hospital grade, 3-prong, grounded connector. International: Internationally color-coded power cable assembly. A qualified technician should connect the appropriate AC connector to the internationally color-coded line cord.	**Power Connection** Same as 845(A)	**Power Connection** Rear panel connector Power cable assembly, P/N 320-193, supplied. The power cable assembly plugs into the rear panel connector. A qualified technician should connect the appropriate connector that attaches to the power source.
Control Logic Board Two interchangeable physical configurations; functionally the same. Refer to Configuration Matrix, IPBs, and Parts List in Appendix B.	**Control Logic Board** Two interchangeable physical configurations; functionally the same. Refer to Configuration Matrix, IPBs, and Parts List in Appendix B.	**Control Logic Board** One configuration. Refer to Configuration Matrix, IPBs, and Parts List in Appendix B.
Quad Display Board Differs from other models because of switch/control functions. Refer to Appendix B.	**Quad Display Board** Differs from other models because of switch/control functions. Refer to Appendix B.	**Quad Display Board** Differs from other models. Air pump control circuit, overpressure switch, and voltage select assembly are located on separate Transformer Board.
Transformer Board None	**Transformer Board** None	**Transformer Board** 845XT-IEC models
Transformer/Pump Assembly One of two physical configurations; functionally the same. Refer to IPBs in Appendix B.	**Transformer/Pump Assembly** One of two physical configurations; functionally the same. Refer to IPBs in Appendix B.	**Transformer/Pump Assembly** Assembly differs from domestic models.

1.5.1 TECHNICAL ASSISTANCE

If the monitor fails to function properly or requires maintenance, contact the Critikon Sales Representative or call Critikon Field Engineering at 1-800-237-5591; in Florida, call 1-813-887-2000.

1.5.2 REPAIR SERVICE

To obtain repair service, contact Critikon Field Engineering. State your

- name,
- hospital name,
- address,
- telephone number,
- unit model number,
- serial number, and
- the nature of the problem.

Critikon's Field Service Representative will advise you of the corrective action required.

If you are advised to return the monitor to Critikon for repair, do the following:

1. Package the monitor with adequate protection. If available, use the original materials in which the monitor was shipped.
2. Include a brief description of the problem as well as the name, address, and phone number of the person to be contacted for additional information.
3. Include a purchase order number if the monitor being returned is out of warranty.
4. Ship the monitor, transportation prepaid, to the location specified by your Critikon Field Service Representative. Repairs will be made at the appropriate service facility and the monitor will be returned to the purchaser prepaid.

SECTION 2
PRODUCT DESCRIPTION

Using the oscillometric technique, the DINAMAP™ Monitor measures and displays systolic, diastolic, mean arterial pressure (MAP), and heart rate of critical care patients. The monitor employs "incremental deflation" to produce determination results. (Refer to Figure 4-2, Incremental Deflation Sequence.)

Initially, the monitor will inflate the cuff to approximately 170 mmHg (22.6 kPa), which typically will be high enough to occlude the artery. Subsequent inflation levels will be higher if the initial inflation level was not high enough to occlude the artery. After the artery is occluded, the cuff will begin to deflate in increments of approximately 8 mmHg (1.0 kPa).

NOTE

If cuff inflation is greater than 275 mmHg (36.6 kPa) (nominal), the overpressure switch automatically deflates the cuff.

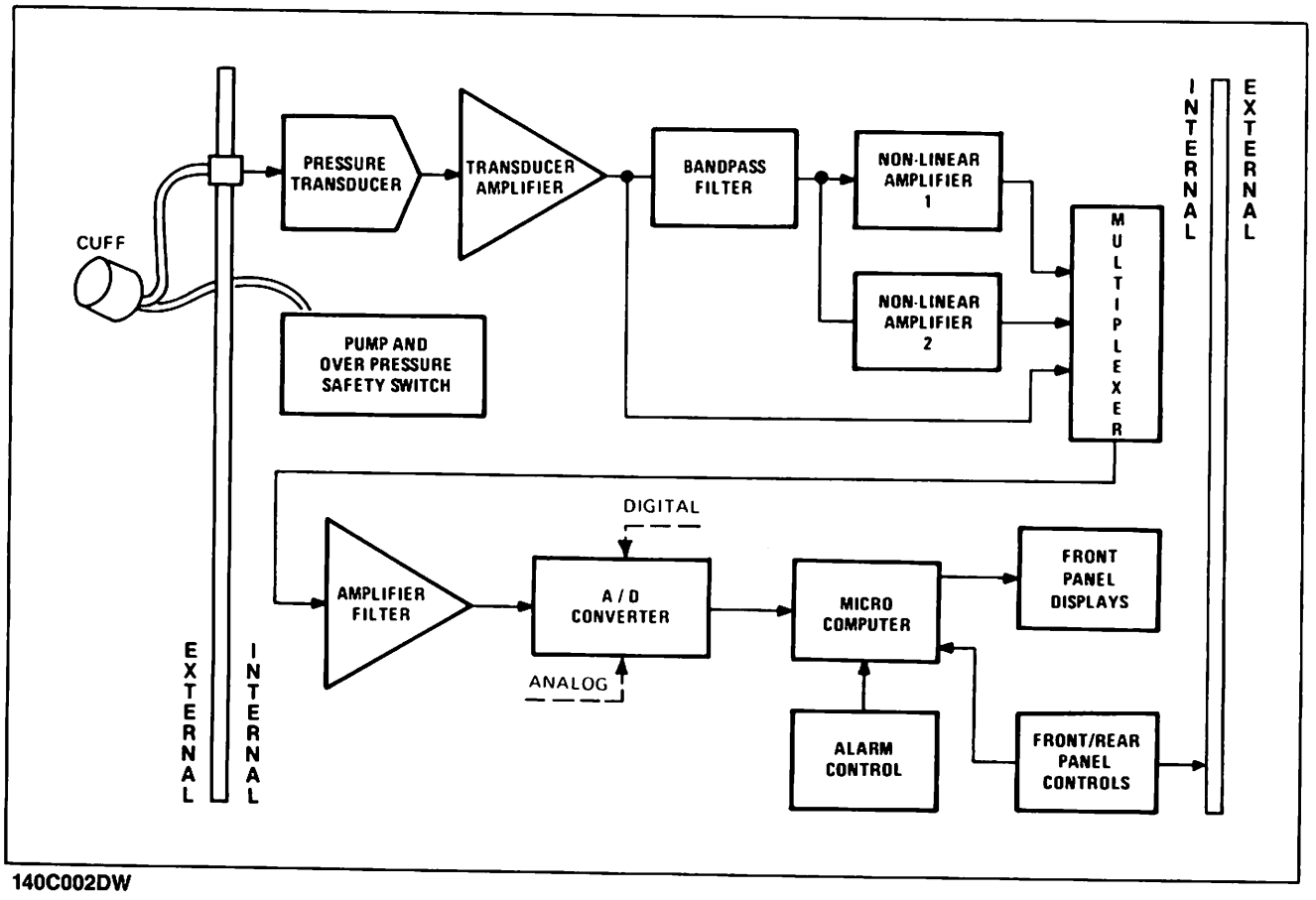


Figure 2-1. Simplified Block Diagram

At each step, the monitor measures the amplitude of the pressure pulsations (oscillations) introduced into the cuff by the movement in the arterial wall. During cuff deflation, the microcomputer processes and stores two consecutive pressure pulsations of equal amplitude and frequency. If the microcomputer is unable to find two matched pulses within two seconds, the cuff deflates another step.

This process of finding matched pulses is a major component of the artifact rejection system. At each pressure level, the microcomputer stores the cuff pressure, the pulsation amplitude, and the time between successive heartbeats. By analyzing these parameters, the monitor can determine the point in cuff pressure where the pulsations increase, peak, and decrease. This process of stepped deflation continues until the microcomputer finds the desired parameters or until the cuff pressure nears zero. At the end of the determination period, the microcomputer processes the data stored during cuff deflation and displays the results on the front panel windows.

For detailed explanations of the determination sequence, definitions of the parameters measured, and the cycle timing concept, refer to the appropriate DINAMAP™ Adult/Pediatric Vital Signs Monitor Operation Manual.

Figure 2-1 contains a simplified functional diagram of the monitor's operation. It illustrates the operational sequence from the initial cuff placement to the time the determination results display on the front panel windows.

SECTION 3
PHYSICAL DESCRIPTION

3.1 CONTROLS, INDICATORS, AND CONNECTORS

This section describes the DINAMAP™ Monitor's controls, indicators, and connectors.

Each item called out in Figures 3-1 and 3-2 is described in Table 2. Each item called out in Figures 3-3 and 3-4 is described in Table 3. Locate each feature on the appropriate monitor model when reading the functional descriptions.

WARNING

To prevent electric shock hazard, do not remove instrument cover. Refer servicing to qualified service personnel.

TABLE 2. CONTROLS, INDICATORS, CONNECTORS — MODEL 845(A)

Item No.	Name	Function
1.	POWER Switch: ON/OFF	This switch controls the AC power to the monitor. When AC power is cycled initially, all display windows light (lamp test); then, zeros display followed by a brief audible alarm test sound.
2.	MODE Switch: AUTO/CAL	This switch controls the operation mode. In AUTO, the monitor cycles automatically based on user-selected time delays. Moving the switch from AUTO to CAL during a determination cycle does not affect the determination in progress. The monitor completes the cycle and shifts to the CAL mode at the end of the wait period. Moving the switch from CAL to AUTO causes the monitor to initiate automatic determinations. In CAL mode, the air pump is disabled. (Unit calibration may be verified by using a mercury manometer and by attaching the Cal kit to the right rear cuff connector. See Section 8.)
3.	Digital Displays:SYSTOLIC, DIASTOLIC and MEAN ARTERIAL PRESSURE. HEART RATE BPM	These four displays provide a visual readout of Systolic, Diastolic, Mean Arterial Pressure (MAP), and Heart Rate (BPM). The cuff pressure and elapsed time since the last determination displays alternately in the MAP window.
4.	Alarm Limits: OFF/ON SET HIGH/LOW	These two switches control alarm limits. In the OFF position, the audible alarm is disabled and the red alarm LED directly above the Alarm OFF/ON switch lights and stays lit. If an alarm condition is detected with the Alarm switch in the OFF position, the red alarm LED flashes. In the ON position, the alarm sounds briefly when the power is turned ON. The alarm also sounds when an alarm condition is detected. The alarm functions and conditions are described in Table 4. The SET HIGH/LOW switch is used to change the automatically preset MAP alarm limits — High 140 mmHg (18.6 kPa)/Low 50 mmHg (6.7 kPa). (Refer to the appropriate DINAMAP™ Monitor operation manual.)
5.	ADD MINUTES: (Cycle Time Switches)	These switches provide the user a means to increase the basic one minute (nominal) determination cycle to a maximum delay of 16 minutes (nominal) between cycles. To increase the interval between determinations, move to the ADD/UP position any combination of these switches. (Refer to the appropriate DINAMAP™ Monitor operation manual.)

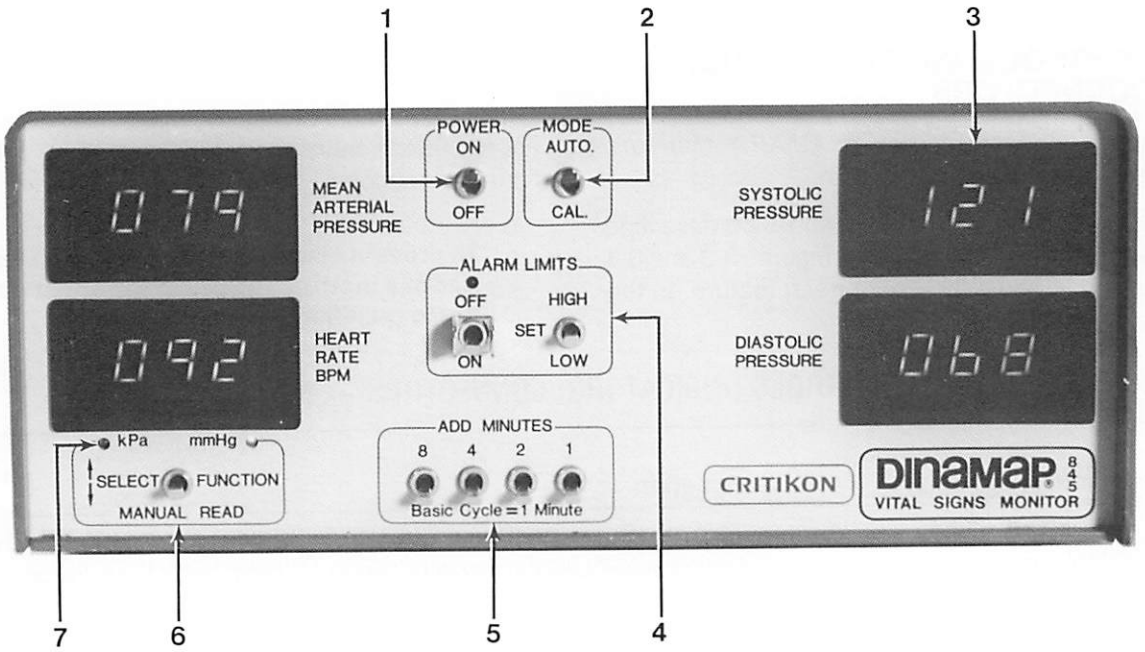


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Figure 3-1. DINAMAP™ Monitor, Model 845(A) Front Panel

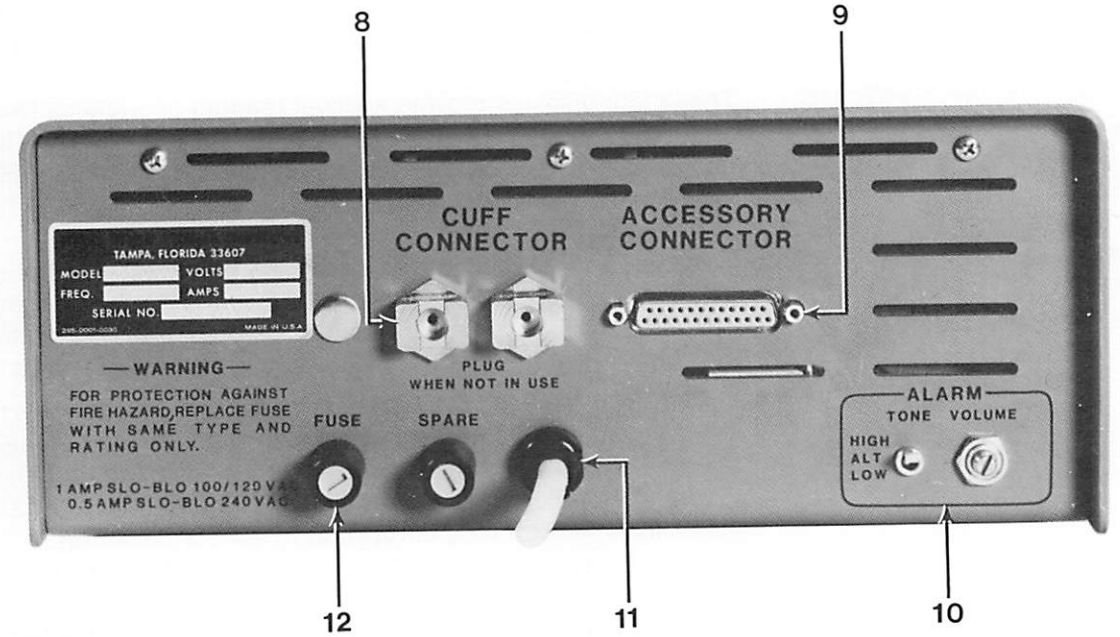

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Figure 3-2. DINAMAP™ Monitor, 845(A) Rear Panel

TABLE 2. CONTROLS, INDICATORS, CONNECTORS — MODEL 845(A) (Cont'd)

6.	SELECT FUNCTION/ MANUAL READ Switch	This switch provides the user the means to select the readings to display in either kPa or mmHg. Momentarily lift this switch to select the readings to display in either kPa or mmHg. Press down momentarily to initiate a determination cycle during the wait period. Press and hold down this switch for approximately four seconds to initiate a header printout on the Critikon Trend Recorder/Printer, if it is connected to the monitor. After four seconds, a short tone sounds and the alarm LED flashes.
7.	kPa/mmHg (Unit of Measurement) Indicators	kPa and mmHg indicators light to indicate whether the monitor is measuring kPa or mmHg.
8.	Cuff/Hose Connector	The screw-type cuff connectors secure the cuff to the air hose. In turn, the spring clip pneumatic connectors secure the air hose to the rear panel cuff connector.
9.	Accessory Connector	This connector provides signal lines to drive a digital printer. The accessory connector also provides the following test signals: 1. MCLR-1 2. MCNT-0 3. HRCLR-1 4. HRCNT-0 5. SYSCLR-1 6. SYSCNT-0 7. DIACLR-1 8. DIACNT-0 9. S DATA-1 10. PRES-0 11. DIG GRD. 12. DPDT NEO 13. DIG GRD 14. + 5 15. +12 16. −12 17. ANASEL-1 18. DATAUP-1 19. ALARM GATE-1 20. ALARM-0 21. CHASSIS GRD. 22. DPDT 23. PT 24. ANALOG GRD. 25. XMIT DATA
10.	Alarm TONE Switch/VOLUME	The tone switch provides a means to select a high, low, or alternating high/low frequency alarm tone. The alarm potentiometer controls the alarm volume.
11.	AC Power Cord/Plug	On domestic units, the safety yellow AC power cord passes through the rear panel to the Power switch on the Quad Display Board. The power cord is equipped with a hospital grade, 3-prong, grounded connector. **The connector receptacle must be an approved 3-pin socket with proper voltage and frequency.** On international Model 845(A) units, a power cable assembly is supplied. **NOTE** On non-U.S. and non-Canadian units, a qualified technician should connect the appropriate AC connector to the internationally color-coded line cord.
12.	AC Line FUSE/SPARE	The monitor is fused for the protection of the user. **REPLACED FUSES MUST BE OF THE SAME TYPE AND RATING AS SPECIFIED ON THE REAR PANEL.** Repeated fuse failure may indicate an electrical problem which should be solved by a qualified service representative.

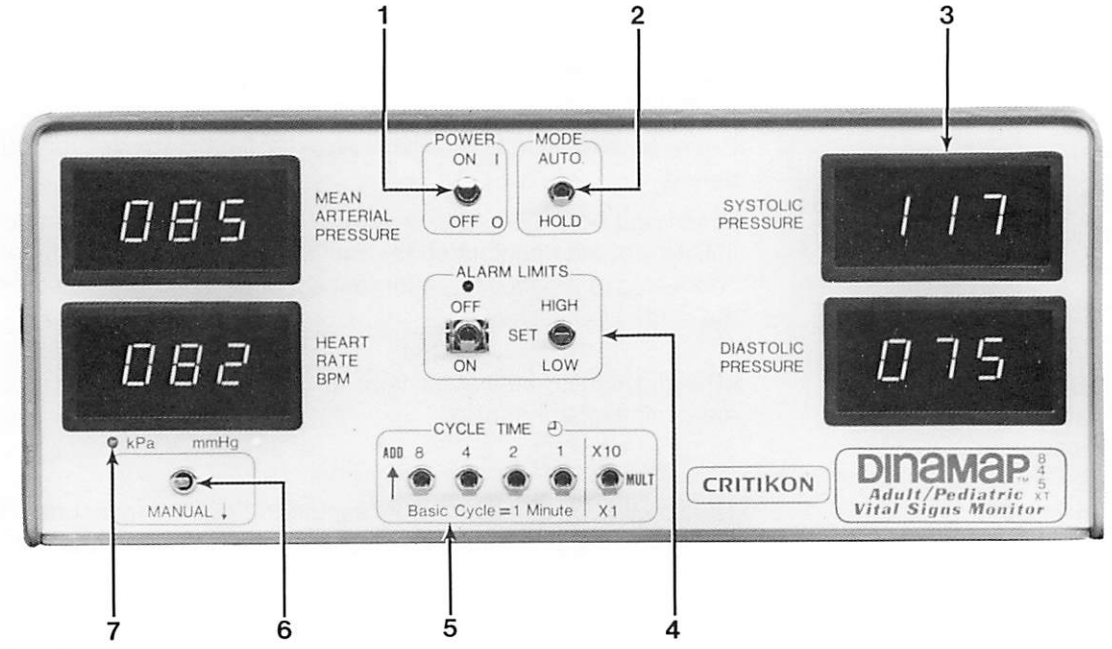

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Figure 3-3. DINAMAP™ Monitor, Model 845XT Front Panel

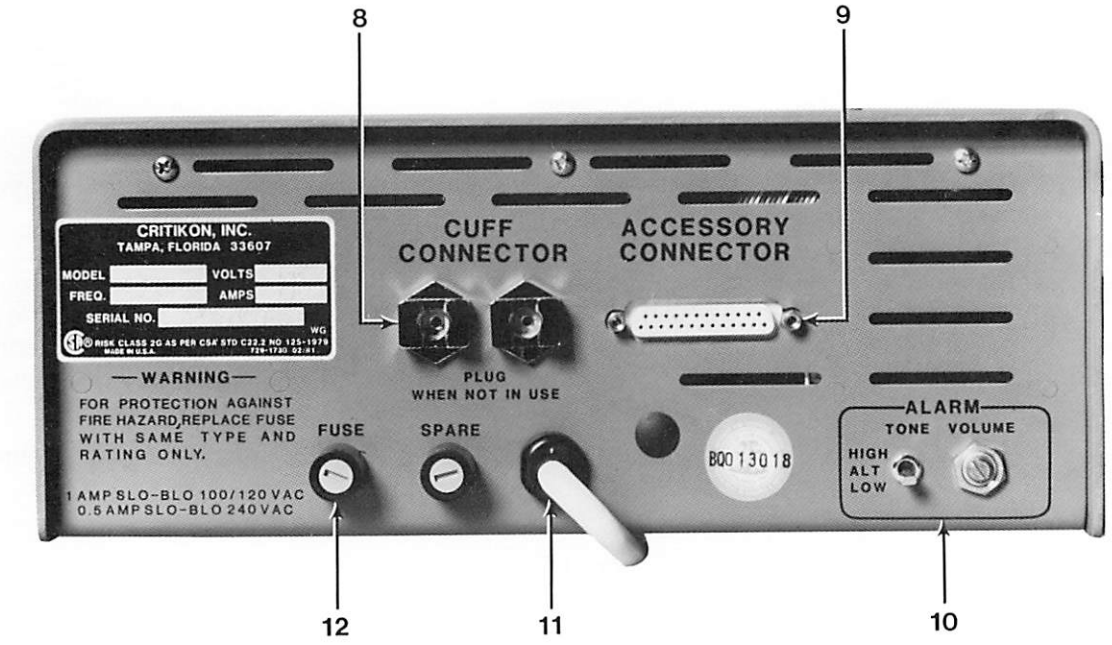

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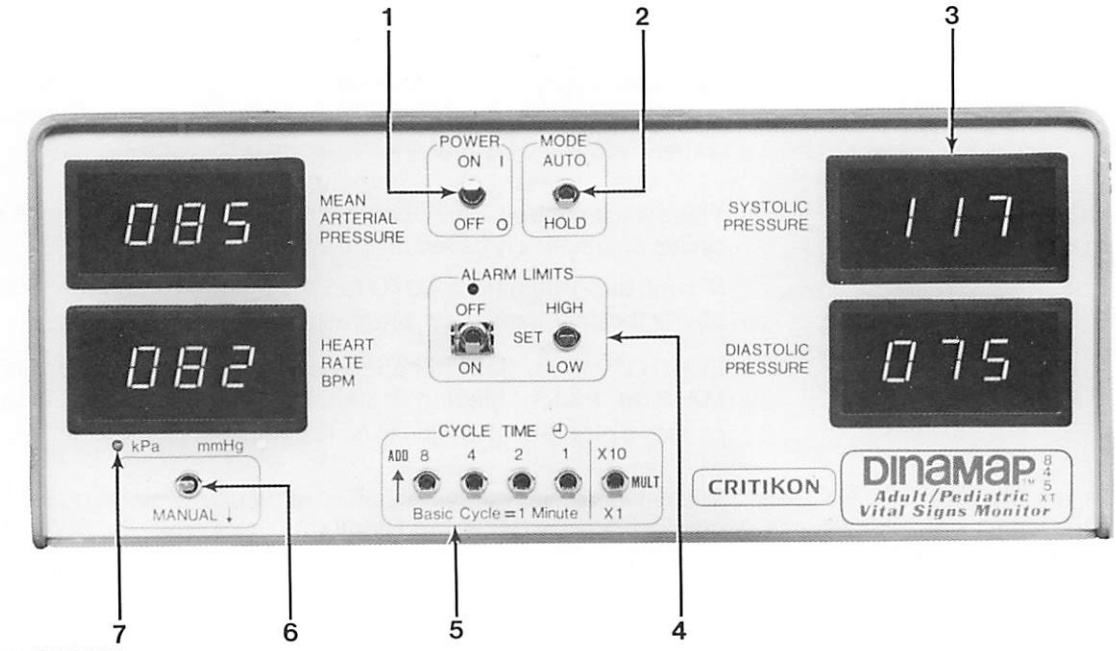
Figure 3-4. DINAMAP™ Monitor, Model 845XT Rear Panel

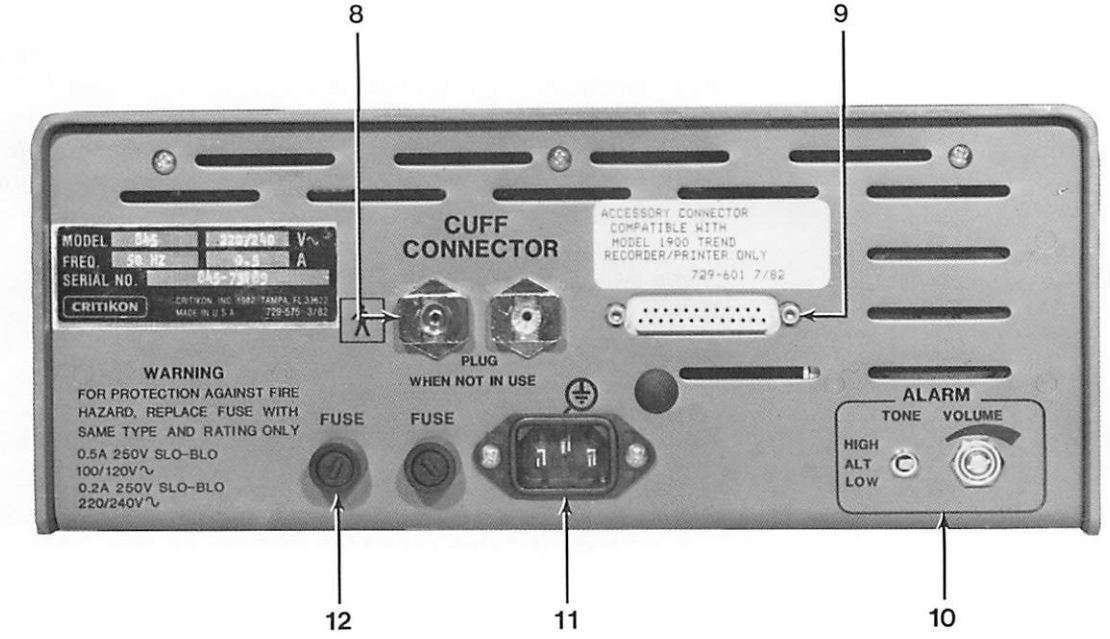
TABLE 3. CONTROLS, INDICATORS, CONNECTORS — MODELS 845XT AND 845XT—IEC

Item No.	Name	Function
1.	POWER Switch: ON/OFF	This switch controls the AC power to the monitor. When AC power is cycled initially, all display windows light (display test); then, zeros display followed by a brief audible alarm test sound.
2.	MODE Switch: AUTO/HOLD	This switch controls the operation mode. In AUTO mode, the monitor cycles automatically based on the cycle time selected. Moving this switch from AUTO to HOLD during a determination cycle aborts the determination in progress and the cuff deflates. In HOLD mode, determinations can be initiated by pressing the MANUAL switch. Moving the MODE switch from HOLD to AUTO causes a new determination to be initiated.
3.	Digital Displays: SYSTOLIC, DIASTOLIC, and MEAN ARTERIAL PRESSURE. HEART RATE BPM	These four displays provide a visual readout of systolic, diastolic, mean arterial pressure (MAP), and heart rate. NOTE 1: During determination cycle, MAP window displays cuff pressure. NOTE 2: During extended time cycles, the elapsed time displays approximately every 10 seconds for one second in the HEART RATE window.
4.	ALARM LIMITS: OFF/ON SET HIGH/LOW	These two switches control alarm limits. In the OFF position, the audible alarm is disabled and the red LED above the Alarm OFF/ON switch lights and stays ON. If an alarm condition is detected with the Alarm switch in the OFF position, the red LED flashes. In the ON position, the alarm sounds briefly when the power is turned ON. The alarm also sounds when an alarm condition is detected. The alarm functions and conditions are described in Table 4. The SET HIGH/LOW switch is used to change the automatically preset MAP alarm limits — High 140 mmHg (18.6 kPa)/Low 50 mmHg (6.7kPa). (Refer to this service manual Appendix A and appropriate DINAMAP™ Monitor operation manual.)
5.	CYCLE TIME Switches: (Add Minutes)	These switches provide the user a means to increase the basic one minute determination cycle to a maximum delay of 160 minutes between cycles. (Refer to the appropriate DINAMAP™ Monitor operation manual.)
6.	MANUAL Switch	**Manual:** Pressing this switch while in the AUTO/HOLD mode initiates a determination. **Printer:** Pressing and holding the MANUAL switch for approximately four seconds initiates a header printout on the Critikon Trend Recorder/Printer, if it is connected to the monitor. After four seconds, a short tone sounds and the alarm LED lights. **CAL Mode:** First press this switch; then turn the power ON to access the CAL mode. (Unit calibration may be verified by using a mercury manometer and by attaching the Cal kit to the right rear cuff connector or to the cuff assembly. Refer to Section 8.)



140C007BF

Figure 3-5. DINAMAP™ Monitor, 845XT—IEC Front Panel



140C008BF

Figure 3-6. DINAMAP™ Monitor, 845XT—IEC Rear Panel

TABLE 3. CONTROLS, INDICATORS, CONNECTORS, MODELS 845XT AND 845XT—IEC (Cont'd)

7.	kPa/mmHg • (Unit of Measurement) Indicators	kPa and mmHg indicators light to indicate whether the monitor is measuring kPa or mmHg.

NOTE 1.

On Model 845XT, the unit of measurement is selected by the position of the select plug inserted internally in U9 on the rear left-hand corner of the Quad Display Board.

NOTE 2.

On Model 845XT—IEC, the unit of measurement is selected by the function select switch located internally on the front left-hand corner of the Quad Display Board. When in the UP position, readings display as kPa; when in the DOWN position, readings display as mmHg.

8.	Cuff/Hose Connector	Screw type cuff connectors secure the cuff to the air hose, and spring clip pneumatic connectors secure the air hose to the rear panel cuff connector.
9.	Accessory Connector	This connector provides signal lines to drive a digital printer. The Accessory Connector also provides the following test signals:

1. MCLR-1	9. SDATA-1	17. ANASEL-1
2. MCNT-0	10. PRES-0	18. DATAUP-1
3. HRCLR-1	11. DIG GRD.	19. ALARM GATE-1
4. HRCNT-0	12. DPDT NEO	20. ALARM-0
5. SYSCLR-1	13. DIG GRD	21. CHASSIS GRD.
6. SYSCNT-0	14. + 5	22. DPDT
7. DIACLR-1	15. +12	23. PT
8. DIACNT-0	16. −12	24. ANALOG GRD.
		25. XMIT DATA

10.	Alarm TONE Switch/VOLUME	The Tone Switch provides a means to select a high, low, or alternating high/low frequency alarm tone. The alarm potentiometer controls the alarm volume.
11.	AC Power Cord/Plug	On Model 845XT, the safety yellow AC power cord is equipped with a hospital grade, 3-prong, grounded connector. **The connector receptacle must be an approved 3-pin socket with proper voltage and frequency.** Power cable assembly, P/N 320-193, is supplied with the international monitor Model 845XT—IEC. The power cable assembly plugs into a connector on the monitor rear panel. **The connector which attaches to the power source must be connected by a qualified technician.**
12.	AC Line FUSE/SPARE (845XT) FUSE/FUSE (845XT—IEC)	The monitor is fused for the protection of the user. **REPLACED FUSES MUST BE OF THE SAME TYPE AND RATING AS SPECIFIED ON THE REAR PANEL.** Repeated fuse failure may indicate an electrical problem which should be solved by a qualified service representative.

3.2 AUDIBLE-VISUAL ALARM FUNCTIONS AND CONDITIONS

The audible/visual alarm alerts the operator of most deviations from normal operation. When the monitor detects such a deviation, the audible/visual alarm responds. Table 4 lists common conditions that may trigger an alarm and the corrective actions that should be taken.

WARNING

The audible alarm, the displayed data, or a combination thereof indicates error conditions due to incorrect cuff connections; leaks, kinks, or obstructions in the system; or hardware failure. Therefore, the alarm switch should always be in the ON position when operating in the AUTO mode. In the OFF position, indications of unusual changes in a patient's blood pressure may go unnoticed.

TABLE 4. ALARM FUNCTIONS AND CONDITIONS

Alarm	Indication	Condition	Response
Power-Up	1-second alarm	Occurs when the monitor is turned ON	None
Voltage Levels Out-of-Limits	Pulsating alarm with alternating zeros and eights in all 4 displays.	Occurs anytime voltage levels fall below acceptable limits prior to a determination cycle.	Cycle monitor OFF and back ON. Check AC power line voltage. If same indication is observed, contact your service representative.
Out-of-Limits	6-second alarm	Occurs when a determination is outside of the preset or user-selected upper or lower (MAP) limits. This alarm will also sound if a MAP reading cannot be determined.	1. Change alarm limits as required. 2. Check patient for pulse and/or place cuff on another extremity before taking another reading. If same indication is observed, verify patient's blood pressure via conventional method.
Excess Inflation Time	6-second alarm	Occurs after the monitor has attempted to inflate the cuff for more than approximately 40 seconds. This alarm is always followed by an Out-of-Limits alarm.	1. Check cuff and hose connections for leaks. 2. Check the internal pneumatic system for leaks or contact your service representative.
Failsafe	Continuous Alarm Internally Controlled	The alarm will sound within approximately 3 minutes of an internal failure. This alarm will also sound if the monitor is left in CAL mode.	Turn system OFF then ON. If same failure occurs, contact your service representative.

TABLE 4. ALARM FUNCTIONS AND CONDITIONS (Cont'd)

Hang-Up	Continuous Alarm Internally Controlled	Occurs during determination cycle, as follows: 1. If the monitor stays at one inflation level longer than approximately 60 seconds. 2. If determination takes longer than approximately 150 seconds. For either condition a Failsafe alarm will sound if operator intervention does not occur within 2 minutes of failure.	Turn monitor OFF, reposition cuff, observe patient for excessive motion. Turn monitor ON and attempt another determination. If problem persists, contact your service representative.

For additional assistance, call Field Service at 1-800-237-5591; in Florida, call 1-813-887-2000.

SECTION 4
INSTALLATION AND OPERATION

The following section addresses the initial set-up instructions, operating precautions, and the recommended control settings of DINAMAP™ Monitor. This section also includes the recommended sequence for a typical operating cycle.

4.1 OPERATING PRECAUTIONS

- **Place the monitor on a rigid surface.**
- **Arrange carefully the power cord and pneumatic hoses so they do not constitute a hazard.**
- **Allow for heat dissipation by ensuring that the rear of the chassis is unobstructed.**
- **Do not place fluids on the monitor.**
- **Do not use the monitor in the presence of flammable anesthetics.**
- **Observe frequently the patient's cuffed extremity for signs of impeded blood flow when monitoring for prolonged periods using the 1-2 minute intervals.**
- **Observe all caution and warning labels on the monitor.**

4.2 INSTALLATION

With monitor Power OFF:

1. Connect the dual air hose securely to the cuff connectors on the rear panel of the monitor.
2. First, measure the extremity to be monitored. Then, select the proper size cuff (refer to Operation Manual for cuff sizes). Attach the cuff securely to the dual air hose.
3. Squeeze all air from the cuff before wrapping it securely around the patient's limb.

   NOTE

   Excessive tightness will cause venous congestions and discoloration of the limb.

4. Center the cuff bladder on a major artery. The brachial artery (upper arm) is the recommended monitoring site. However, placing the cuff on other locations of the body such as the forearm, ankle, calf, or thigh will also provide reliable determinations.

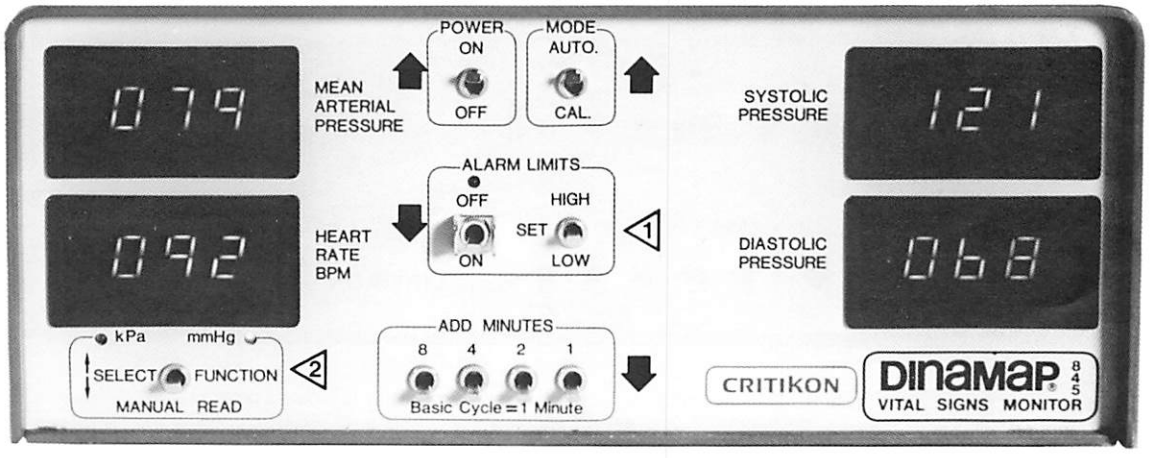
   WARNING

   Do *not* place the cuff on an extremity being used for intravenous infusion.

5. If it becomes necessary to change the cuff to another limb, make sure the appropriate size cuff is used.
6. Arrange the cuff hoses so they are unobstructed during the monitoring procedure.
7. Place the alarm, cycle time, and mode switches in the desired positions; refer to Figure 4-1 (a, b, c).
8. If the unit is equipped with a locking screw (chassis bottom), remove it before monitoring.
9. Carefully read the Operating Precautions listed in Section 4.1 before operating the monitor.

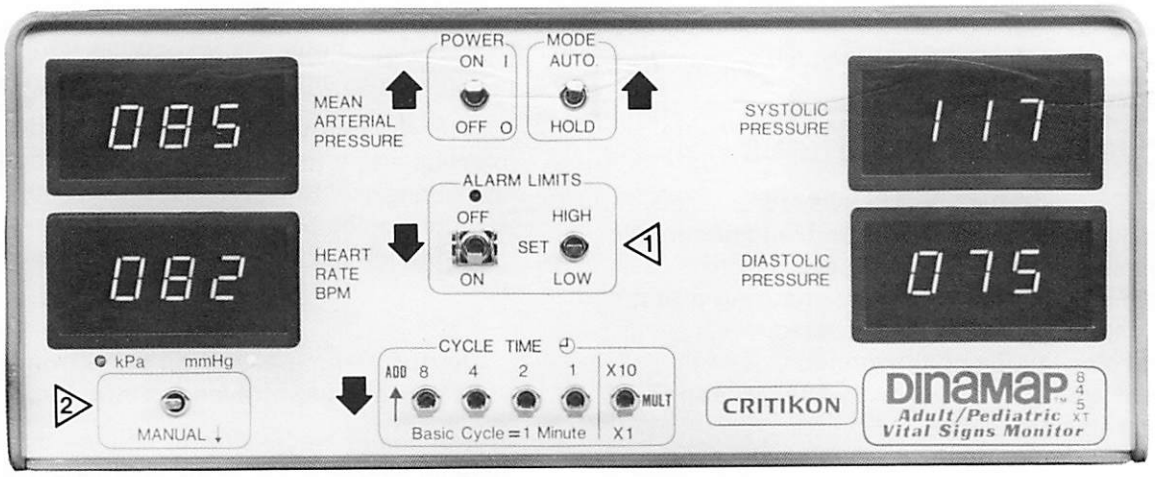
4.3 RECOMMENDED CONTROL SETTINGS

Figure 4-1 (a, b, c) illustrate the control settings as they should appear during a typical monitoring procedure.



140C009DW

Figure 4-1a. Recommended Control Settings — DINAMAP™ Monitor Model 845(A)

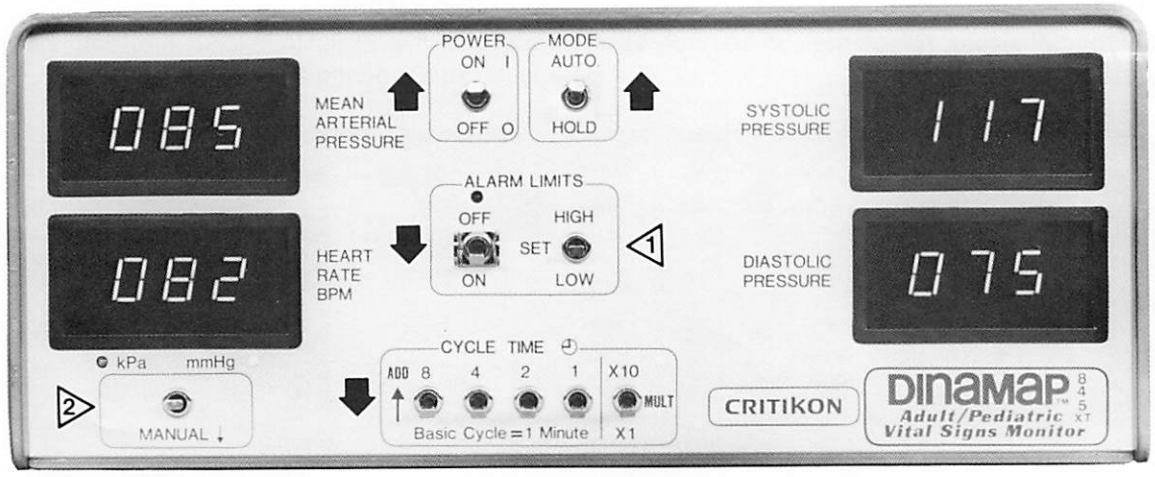


1 Use to change preset alarm limits H-140/L-50 mmHg.

2 Depress momentarily to initiate a determination.

140C010DW

Figure 4-1b. Recommended Control Settings — DINAMAP™ Monitor, Model 845XT



1 Use to change preset alarm limits H-140/L-50 mmHg.

2 Depress momentarily to initiate a determination.

140C011DW

Figure 4-1c. Recommended Control Settings — DINAMAP™ Monitor, Model 845XT—IEC

4.4 OPERATION

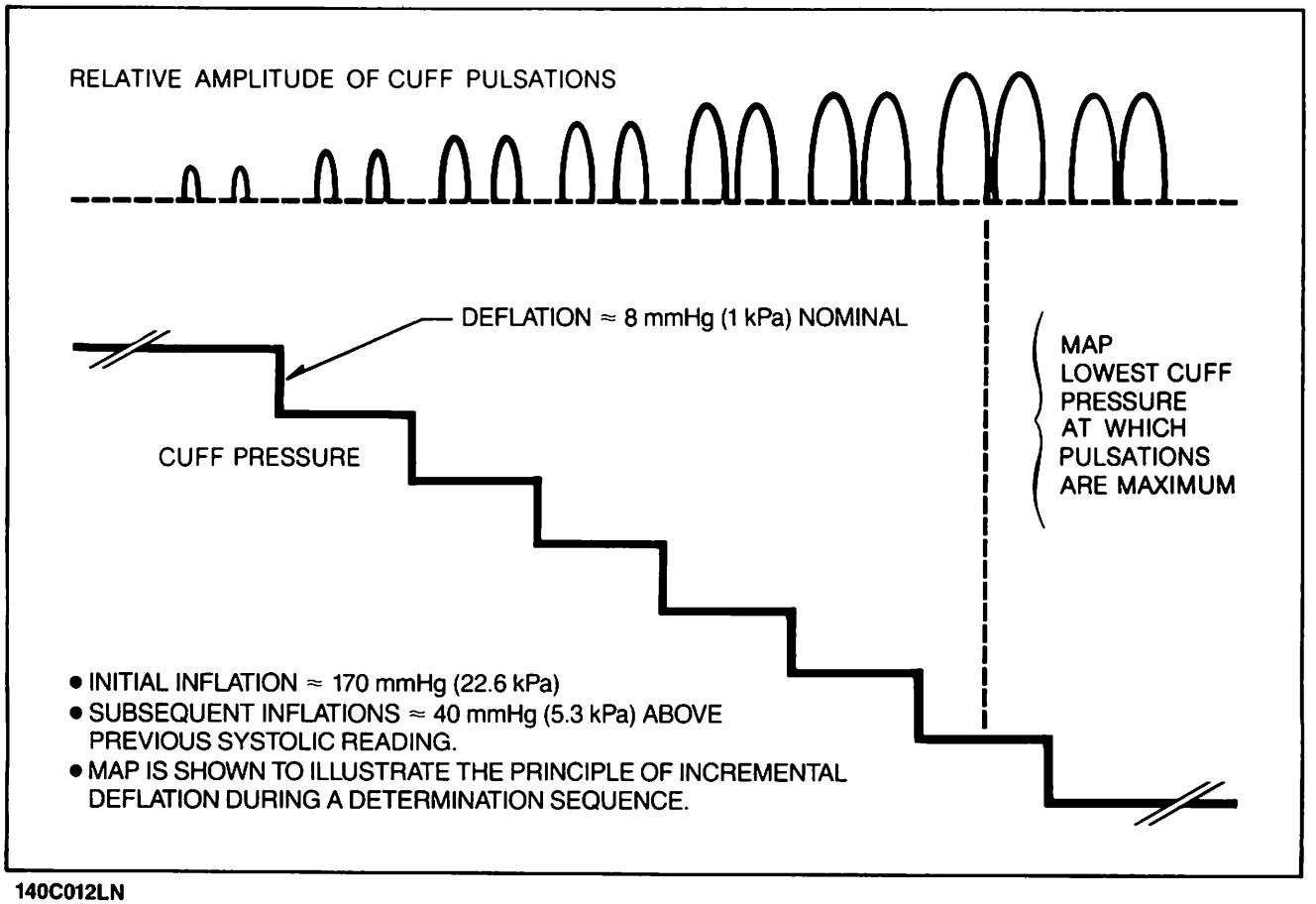
Using the oscillometric technique, the DINAMAP™ Monitor monitors systolic, diastolic, mean arterial pressure (MAP), and heart rate on critical care patients. The monitor employs "incremental deflation" to produce a determination as shown in Figure 4-2.

Initially, the monitor will inflate the cuff to approximately 170 mmHg (22.6 kPa), which typically will be high enough to occlude the artery. Subsequent inflation levels will be higher if the initial inflation level was not high enough to occlude the artery. After the artery is occluded, the cuff will begin to deflate in increments of approximately 8 mmHg (1.0 kPa).

NOTE

If cuff inflation is greater than 275 mmHg (36.6 kPa), the overpressure switch will automatically deflate the cuff.

At each step, the monitor measures the amplitude of the pressure pulsations (oscillations) introduced into the cuff by the movement in the arterial wall. The internal microcomputer processes and averages each pulse amplitude before storing it for future use. The cuff will not deflate until the monitor finds two matched pulses, or until approximately two seconds have elapsed. This process of finding matched pulses is a major component of the artifact rejection system. At each pressure level, the microcomputer stores the cuff pressure, the pulsation amplitude, and the time between successive heartbeats. By analyzing these parameters, the monitor determines the point in cuff pressure where the pulsations increased, decreased, and peaked. This process of stepped deflation continues until the microcomputer has found the desired parameters or until the cuff pressure nears zero. At the end of the determination period, the microcomputer processes the data stored during cuff inflation and displays the results.


RELATIVE AMPLITUDE OF CUFF PULSATIONS
DEFLATION ≈ 8 mmHg (1 kPa) NOMINAL
CUFF PRESSURE
MAP
LOWEST CUFF
PRESSURE
AT WHICH
PULSATIONS
ARE MAXIMUM
• INITIAL INFLATION ≈ 170 mmHg (22.6 kPa)
• SUBSEQUENT INFLATIONS ≈ 40 mmHg (5.3 kPa) ABOVE PREVIOUS SYSTOLIC READING.
• MAP IS SHOWN TO ILLUSTRATE THE PRINCIPLE OF INCREMENTAL DEFLATION DURING A DETERMINATION SEQUENCE.

140C012LN

Figure 4-2. Incremental Deflation Sequence

4.5 DETERMINATION SEQUENCE

As the pressure in the cuff is reduced from above occlusion to near zero the following occurs.

At pressures above systolic, there is no arterial flow. The minute pulsations induced into the cuff above occlusion are of a very low, relatively constant amplitude. The cuff deflates incrementally until systolic pressure is determined, at which time a sudden significant increase in pulsation occurs. These pulsations will continue to increase until MAP is established. The amplitude of these pulsations will begin to decrease once MAP has been established. These pulsations again will reach a low, relatively constant amplitude when diastolic pressure is established.

During a complete cycle of operation (inflating and deflating the cuff), the monitor can make the following determinations:

- **Systolic Pressure:** corresponds to the point where the oscillations begin to increase.
- **Diastolic Pressure:** corresponds to the point where the oscillations stop decreasing.
- **MAP (Mean Arterial Pressure):** corresponds to the point where oscillations peak.
- **Heart Rate:** is the median heart rate selected during a blood pressure determination. During each determination, the microcomputer accumulates a series of heart rate periods (two heart beats/period) ranging from high to low; then the microcomputer selects and displays the median heart rate from the series.

SECTION 5
ELECTROMECHANICAL DESCRIPTION

Two major systems are responsible for the DINAMAP™ Monitor's operation. These two systems are the pneumatic system and the electronic system and are discussed in the sections that follow.

5.1 PNEUMATIC SYSTEM

The pneumatic system provides for and regulates cuff inflation and deflation. It also couples the pressure signals from the cuff to the pressure transducer. Figure 5-1 is a simplified block diagram of the pneumatic system.

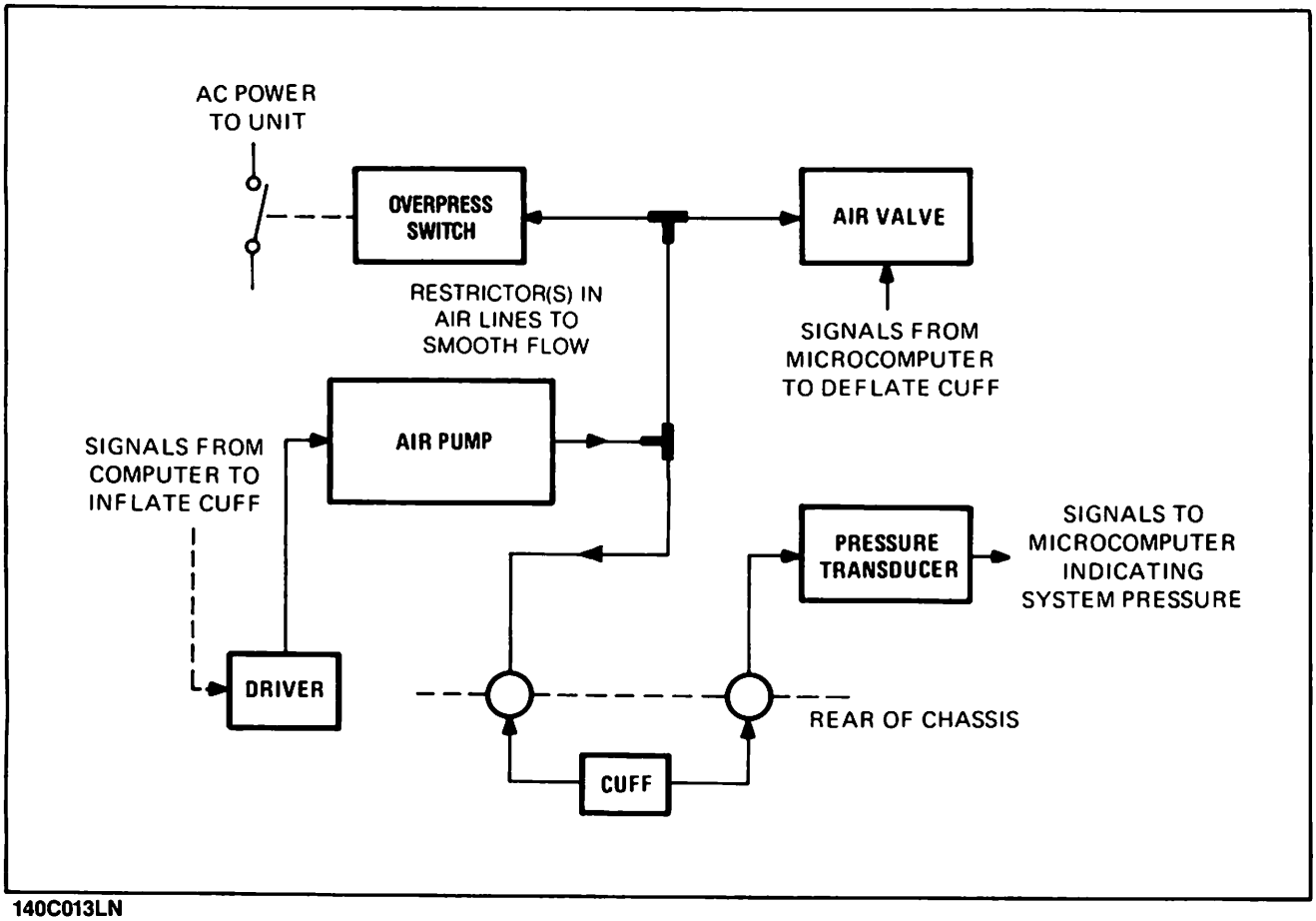
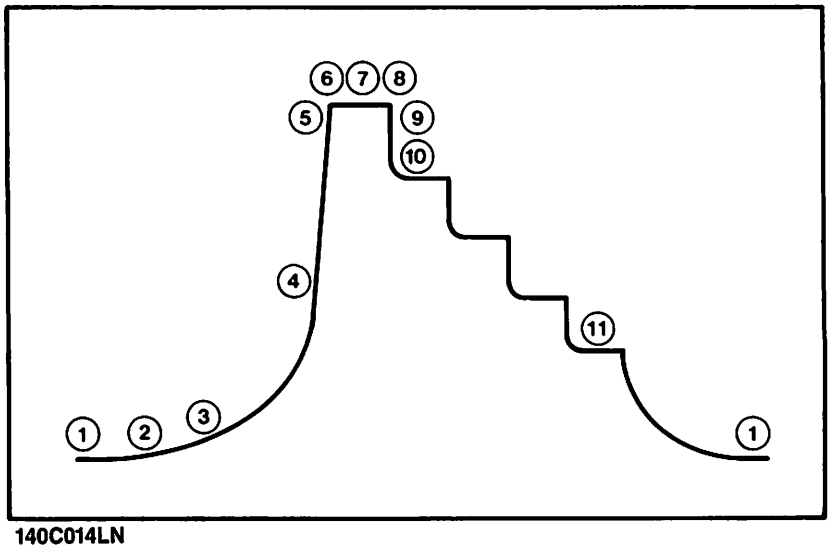


Figure 5-1. Block Diagram of Pneumatic System, DINAMAP™ Monitor

During a typical operating cycle, the pneumatic system functions as follows:

1. The air valve remains open between determination cycles.
2. The air valve closes.
3. The air pump begins to inflate the cuff.
4. The microcomputer monitors cuff pressure via the Control Logic Board.
5. The air pump stops inflating the cuff.
6. The microcomputer stores the cuff pressure values.
7. The microcomputer measures and stores the *average* value of the pressure pulsations.
8. The air valve opens.
9. The microcomputer monitors cuff pressure via the Control Logic Board.
10. The air valve closes.
11. The determination results are displayed on the front panel.

Steps 5 through 9 are repeated during the entire deflation period. At the end of the determination cycle, the air valve opens and remains open.



140C014LN

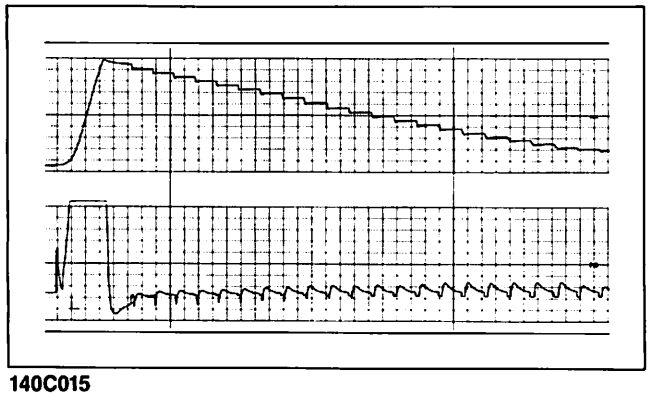
Figure 5-2. Pneumatic System Operating Sequence

OPERATIONAL PNEUMATIC SYSTEM SAMPLE WAVEFORMS

NOTE

The following waveforms were obtained using a chart recorder. They are included to provide technical personnel with additional insight about the function and operation of the monitor's pneumatic system.

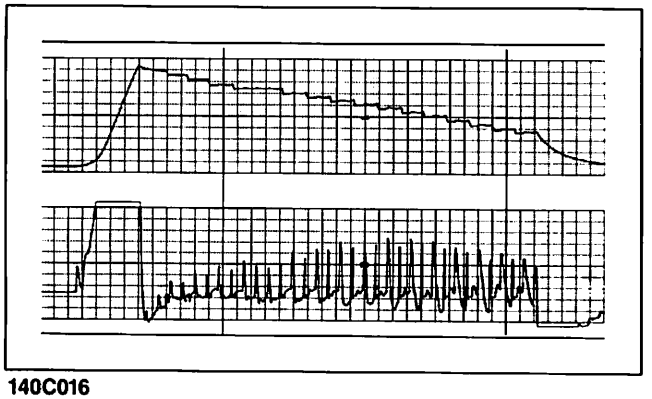
Figure 5-3 illustrates a normal waveform of the pneumatic system during a typical operating cycle. The cuff was wrapped around itself and placed on a tabletop.



140C015

Figure 5-3. Waveform #1

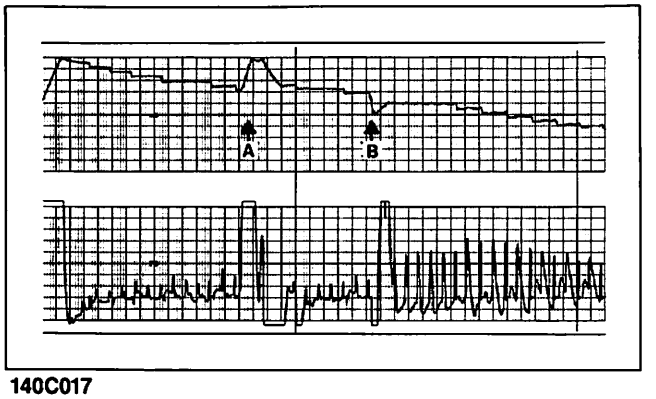
Figure 5-4 illustrates the pneumatic system waveform during a typical operating cycle. In this case, the cuff was wrapped around the patient's arm. The positive pulses in the pulsation waveform are produced by the increase in arterial pressure during heartbeats. These pulsations can also be seen as very small increases in cuff pressure.



140C016

Figure 5-4. Waveform #2

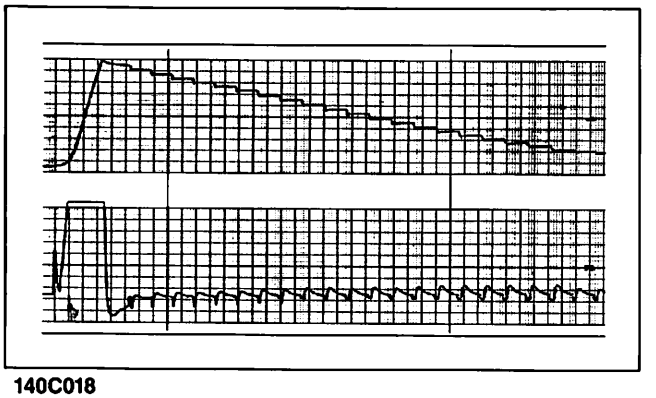
The waveform in Figure 5-5 illustrates the pneumatic system responding to a patient's arm movement. At point A, the patient bent the arm, increasing the cuff pressure. The monitor respondedpening the air valve, causing the pressure to drop to the correct level. At point B, the patient straightened the arm, causing the pressure to drop. The monitor responded by pulsing the air pump until the pressure returned to the correct level.



140C017

Figure 5-5. Waveform #3

In Figure 5-6, the step deflation is essentially a straight line function. The top of each step is flat, and the deflation steps generally are spaced. The average value of the integral signal is constant throughout the deflation period, indicating normal operation.

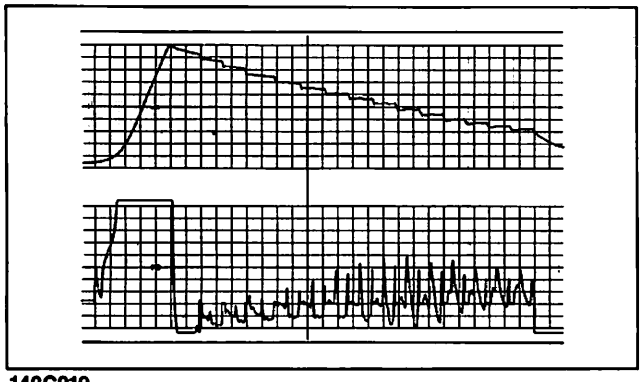


140C018

Figure 5-6. Waveform #4

The waveform shown in Figure 5-7 typifies the pneumatic system responding to a pressure leak. As shown, the rate of deflation is not linear. It varies

considerably with cuff pressure. The top of each step is sloped. The average value of the integral signal varies throughout the deflation cycle.



140C019

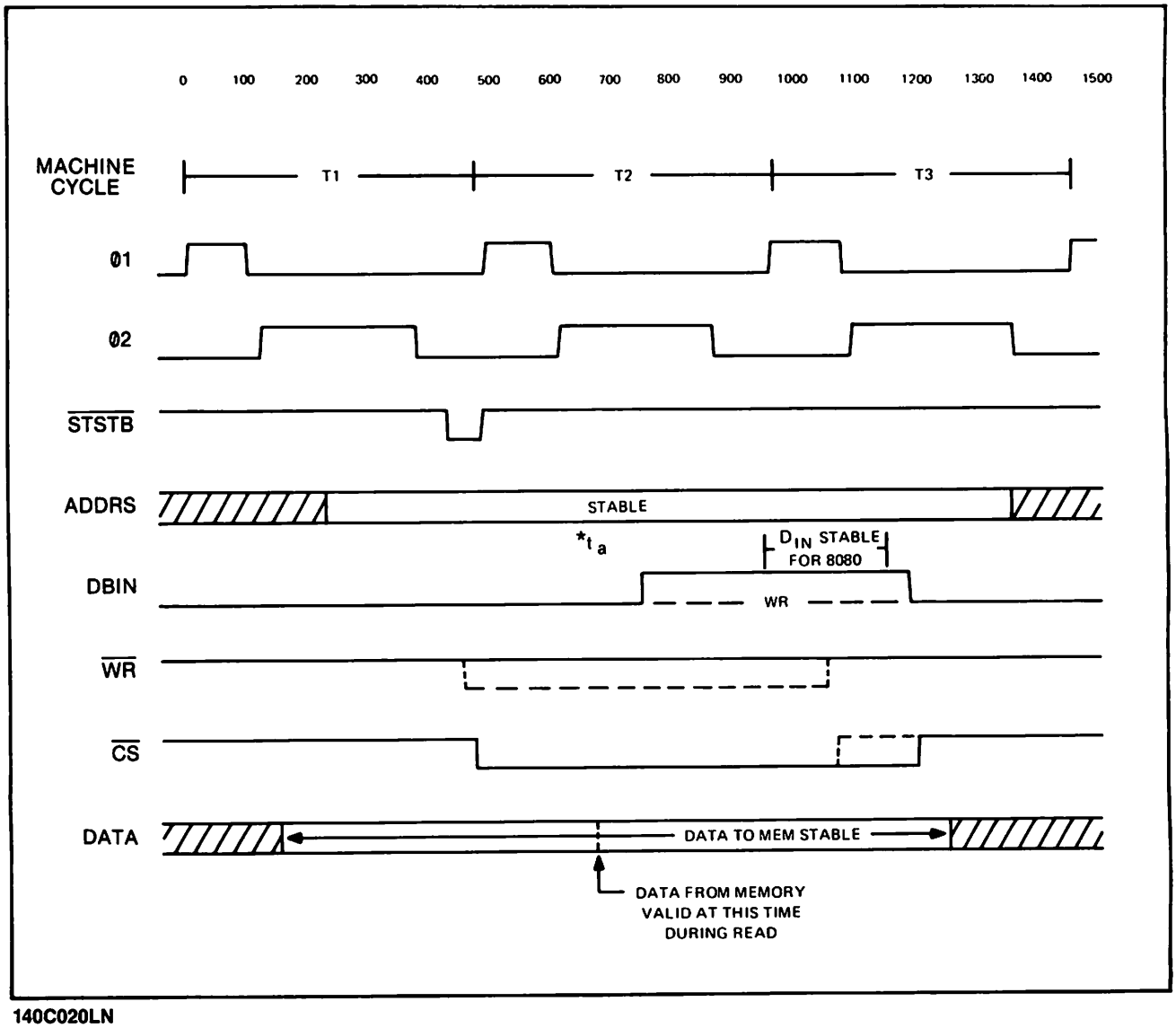
Figure 5-7. Waveform #5

5.2 ELECTRONIC SYSTEM

The DINAMAP™ Monitor electronic system is composed of the following Printed Circuit Board Assemblies:

1. Control Logic Board Assembly
2. Quad Display Board Assembly
3. Power Supply Board Assembly
4. Transformer Board Assembly, Model 845XT—IEC only

The sections that follow describe the function of each assembly and explain their interrelationship. The illustrated parts breakdown (IPB), schematics, component location drawings and their respective parts lists are contained in Appendix B.



140C020LN

Figure 5-8. Microprocessor Timing Diagram

5.2.1 CONTROL LOGIC BOARD ASSEMBLY

The Control Logic Board Assembly is the control center for the entire electronic system. The Control Logic Assembly compares data collected by its support circuits with known data stored in its permanent memory.

5.2.1.1 Control Logic Board Digital Section

The digital section of the Control Logic Board Assembly contains the following integrated circuits: an 8080 microprocessor chip and supporting section as follows:

- four (or five) 2708 EPROMS containing 4K (or 5K) stored program memory,
- two 2114 RAM (Random Access Memory) chips consisting of 1024 bytes of scratch pad memory,
- three 80C98 tri-state gates used as two 8-bit input ports,
- six 74LS175 latches used as 8-bit output ports, and
- one each 8224 and 8228 support chips.

U1 functions as the clock generator and driver. It produces a two-phase clock pulse with appropriate logic levels to drive U2, the 8080 microprocessor chip. The timing diagram shown in Figure 5-8 illustrates the relationship between these signals.

On initial power-up, the network of R73 and C27 produces a signal with a slow risetime (approximately 1 second) at U1-2. This produces a logic 1 signal at U1-1. It remains a logic 1 for approximately 0.5 seconds, then switches to a logic 0. This signal is the master reset that enables the logic circuitry in the monitor.

Internal circuitry in U1 receives the SYNC signal from U2 and generates a signal $\overline{\text{STSTB}}$ (System Strobe) at U1-7. The $\overline{\text{STSTB}}$ signal is fed to the controller U4. It is enabled then at the beginning of each instruction and causes the controller to generate the proper selection of IOWO (Input/Output Write Signal), IORO (Input/Output Read Signal), MEMWO (Memory Write Signal), or MEMRO (Memory Read Signal). These signals enable the memory, or I/O ports along with the address decode. U4 also contains buffers for the data bus, which enhance the drive capability of the bus.

The upper order address bits (A10 through A13) control which block of memory is accessed.

Two types of memory are used:

- EPROM (Erasable Programmable Read Only Memory) U7-U11, which contains a permanent set of data used by U2, and
- RAM (Random Access Memory) U5 and U6 used for temporary storage of calculations made by the microprocessor.

The EPROMS for the different monitor configurations have different programs and carry different Critikon part numbers.

ADDRESS DECODER When enabled by either a MEMWO or MEMRO via U13-8, the address decoder U14 (74LS154) selects a memory block. The notations at the right of U14 are hexadecimal address blocks.

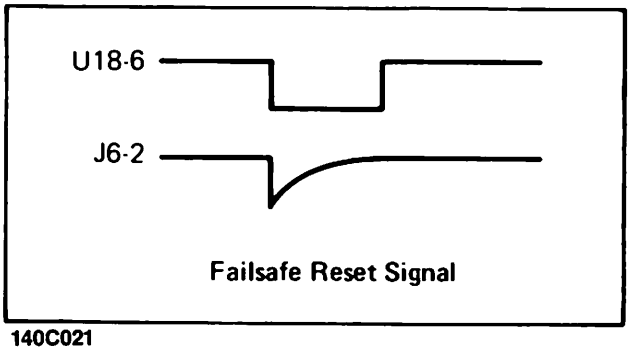
U15 and U16 provide the control signals for the I/O ports.

INPUT PORTS The input ports are enabled by a low signal at the output of U16 pins 1, 2, or 3. If input port O is selected IPEN (Input Port Enable O, True Low), data from the A/D converter will be transferred to the data bus. If input port 1 is selected IPEN1 (Input Port Enable 1, True Low), data from the front panel switch positions will be transferred to the data bus. Input port 2 (IPEN2) also provides data from the front panel switches. Refer to Appendix B.

OUTPUT PORTS The output ports consist of U17 through U22, which buffer U23 and U24. The stable signals needed to turn the air pump on/off, and to operate the front panel displays and alarm, are latched in U23 and U24. The clock signal comes from the output port decoder U15.

The clock signal going to the six (74LS175) latches appears as a negative going pulse; however, it is the positive transition which enters the data into the output port. Many of these output signals travel to the rear panel connector after being buffered by CMOS drivers (U3, U24, U25).

A signal out of U18-6 is used to reset the failsafe alarm on the front panel. This signal is AC coupled via C35, R121 and R122. Consequently, if U18 fails (stuck high or low), the failsafe alarm will not be held in reset. Refer to Figure 5-9.



140C021

Figure 5-9. Failsafe Reset Signal

The 100 ohm resistors in series with the rear panel signals help prevent short circuits from overheating the buffer I.C.s.

5.2.1.2 Control Logic Board Analog Section

The analog section of the Control Logic Board Assembly contains the following circuits:

1. pressure measurement channels:
   - cuff pressure channel and
   - integral (dp/dt) channel,
2. multiplexer and A/D converter,
3. reference voltage,
4. clock generator, and
5. audio alarm circuitry.

PRESSURE MEASUREMENT CHANNELS The pressure measurement channels in the analog section of the Control Logic Board provide two functions:

- The cuff pressure channel constantly measures the air pressure in the cuff. This channel contains a pressure transducer, an amplifier, a scheme that adjusts the DC offset, and circuitry that adjusts the overall DC amplitude gain. The pressure transducer must have a very low noise output. This channel must be DC coupled. The DC offset is adjusted by injecting a voltage into the input of the second stage operational amplifier. The first stage amplifier output supplies the voltage to R11, a 2K potentiometer. The amplitude gain can be adjusted by the ratio of the signal across R14, the potentiometer setting, and R12/R70. The gain range of this amplifier can be changed by adjusting the feedback resistor R14 of the operational amplifier.
- The integral channel measures the amplitude of the pulsations introduced into the cuff. The integral channel signal is taken from the cuff pressure channel output. Consequently, malfunctions in the cuff pressure channel may affect the integral signal. The signal going into the integral channel is AC coupled. Consequently, only the small varying signals are amplified.

Two types of pressure transducers — a constant voltage device or a constant current device — are used in the DINAMAP™ Monitor. However, only one device is installed in each monitor. The constant voltage device uses the +10V reference that is used for other sections of the Control Logic Board. The constant current device uses one section of U39 (operational amplifier) to supply a constant current of approximately 1 milliamp.

The circuit functions as follows: the voltage is divided from the +10V reference by R9 and R8 and fed to U39-5.

Since U39 is an operational amplifier, it will adjust its voltage output to cause the feedback through the transducer and R7 maintaining the same voltage at U39-6. As a result, the current flowing through the transducer remains constant regardless of changes in transducer resistance. With this transducer, as the temperature increases the sensitivity generally decreases; however, by using a constant current source, the monitor is able to self-compensate. The output of the pressure transducer is fed to the input of U35, which is a low noise, low drift, operational amplifier with an approximate gain of 34. R6 and C1 provide external compensation for the operational amplifier, which has no internal compensation capability of its own.

The integral channel consists of two parts: a bandpass filter (see Figure 5-10) and a logarithmic or nonlinear amplifier.

The bandpass filter passes frequencies of approximately 0.5 to 9.0 Hz (3dB points) with an overall gain of approximately 14.

The clamp circuit consisting of Q4, R89, and U32 decreases the determination time. The time constant of C6 causes the filter to have a long recovery time after each incremental deflation. A software-controlled signal applied to JFET Q4 causes a low resistance path (approximately 300 ohms) across the D and S terminals. This causes C6 to assume rapidly the new DC voltage during the time the air valve is open. When the air valve closes, the gate voltage on Q4 changes from approximately +10V to approximately −11V. This causes the D and S terminals to become open circuits, allowing the filter to perform its normal operation.

This software-controlled signal CLO (Clamp Circuit On, True Low) is triggered about the same time and duration as the signal that opens the air valve. The exact time (software-controlled) varies due to delays in the air valve and pneumatic system.

Figure 5-10 illustrates the waveform obtained when the bandpass filter clamp is inoperative.

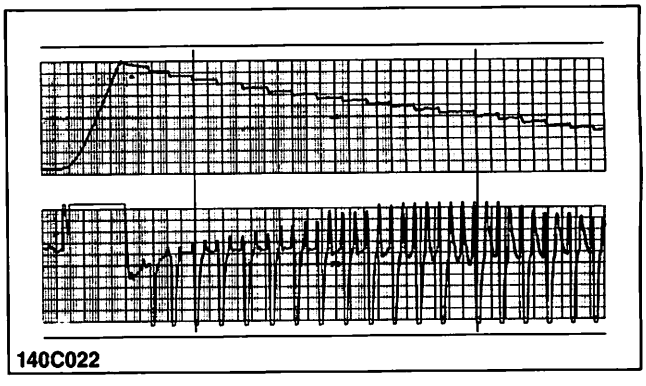


Figure 5-10. Inoperative Bandpass Filter Clamps — Waveform

The nonlinear amplifier is a very important part of the integral channel. It allows the monitor to operate over a large range of input signals.

The basic gain of this amplifier is approximately 1.8. If the output signal increases to the point where a zener diode conducts (approximately 7.5V), an additional feedback resistor (R28) is added. The amplitude gain then becomes approximately 1.3. If the output signal increases to approximately 9.1V, a third feedback resistor is added and the gain becomes 0.7.

Since the signal amplitude is large at this point, the DC bias at this stage is critical. The bias point is adjusted by injecting an offset voltage into the virtual ground of U38 via R30 and R31.

MULTIPLEXER AND A/D CONVERTER The two channels (cuff pressure and integral) in the pressure measurement section constantly measure their respective parameters. The microcomputer checks these values at the appropriate time by enabling one signal or the other to go through the multiplexer. The microcomputer can then initiate an A/D (analog to digital) cycle and interpret the digital output.

Because the conversion system is 8-bits wide (256 binary), one A/D unit equals approximately 39 millivolts; a one chip multiplexer and an A/D converter (ADC0816) is used. This chip has a 16-channel multiplexer and a successive approximation A/D converter. The digital outputs are latched internally at the end of the conversion cycle. A conversion cycle typically will require 64 microseconds.

Another function of the A/D converter is to monitor the DC power supply voltages. A resistive divider at the input of the A/D results in the following voltages at U30 (assuming the power supply voltages are correct).

If a power supply voltage deviates more than 4% from nominal, the monitor responds with an audible/visual alarm. The audible alarm sounds and all four displays indicate alternating zeros and eights respectively. The only way to clear the alarm once triggered is by turning the power OFF and then ON.

To determine which power supply voltage caused the alarm condition, depress and hold the Manual switch for several seconds. The flashing zeros and eights will disappear. Then, four numbers will appear in the display windows. Release the Manual switch. The numbers now displayed correspond to the power supply voltages after they are divided by the resistive dividers to the input of the A/D converter chip. These power supply voltages are listed in Table 5.

REFERENCE VOLTAGE The A/D reference supply (voltage) uses a band-gap diode reference and three operational amplifiers to produce precision +10V, −10V, and +5V references. The 10V supply is used in the input clamping circuit. The +5V supply is the actual reference for the A/D chip.

CLOCK GENERATORS The oscillator section of the Control Logic Board provides several functions. This section serves as a clock for the microprocesor and the A/D converter, and as a realtime clock for the microcomputer's interrupt oscillator. In addition, the

TABLE 5. POWER SUPPLY VOLTAGES

Model 845(A) software revisions prior to RAG and RCA;
Model 845XT and 845XT—IEC software revisions prior to RDA and RBD*

U30 PIN	DC VOLTAGE	POWER SUPPLY	FRONT PANEL READING**
38	2.50 ± 0.05V	+ 5V	MAP 123 to 133
1	2.82 ± 0.06V	+12V	SYSTOLIC 139 to 151
2	1.00 ± 0.07V	−12V	DIASTOLIC 44 to 59
3	2.65 ± 0.10V	− 5V	HEART RATE 130 to 141

Model 845(A) software revision RAG and RCA and beyond;
Model 845XT and 845XT—IEC software revisions RDA and RBD and beyond*

U30 PIN	DC VOLTAGE	POWER SUPPLY	FRONT PANEL READING**
38	2.50 ± 0.05V	+ 5V	MAP 123 to 133
2	1.00 ± 0.07V	−12V	SYSTOLIC 44 to 59
1	2.82 ± 0.06V	+12V	DIASTOLIC 139 to 151
3	2.65 ± 0.10V	− 5V	HEART RATE 130 to 141

**See software revision label on bottom of unit.*
***These readings will display upon initial power-up in CAL mode.*

oscillator section generates the alternating tones for the alarm circuit.

AUDIO ALARM CIRCUITRY The audio alarm circuit of the analog section of the Control Logic Board produces the audio tone when an out-of-limits or fault condition is detected. The volume control on the rear panel is used to adjust the audio level. The tone selector switch on the rear panel controls the alarm tone. The tone can be selected as a high (approximately 800 Hz), low (approximately 500 Hz), or alternating tone. U41 controls these alarm tones.

The audio frequency signal for the alarm is produced by U41, which is a LM555 I.C. This I.C. is connected in a conventional manner to R45, R46, and C34 producing an 800 Hz square wave at U41-3. When transistor Q3 is switched on, C34 is paralleled by the combination of C10 and C11, which reduces the frequency to approximately 500 Hz. By controlling the transistor Q3 with switch S1, a continuous high tone, low tone, or alternating tone can be selected. A low frequency square wave of approximately 4 Hz comes from the divider chain of the master clock and is fed into R43. The junction of R43 and R44 go to the center arm of S1. This junction (with S1 in the center position) causes the square wave to be fed into the base of Q3. If a low or high tone is selected, the voltage is fed into this junction and overrides the square wave that normally would come through R43.

The output of U41 is fed through the volume control on the rear panel. The center arm (S1) picks up the divided signal at the user-adjusted amplitude, and is fed to the LM380 power amplifier circuit. The output of this power amplifier then directly drives the speaker.

The alarm is controlled by U41-4, which is the reset input for the I.C. It is controlled by an output on the Quad Display Board. The output from the Quad Display Board will enable the alarm if the failsafe timer is not reset by the microcomputer, or if the microcomputer detects an out-of-limits condition.

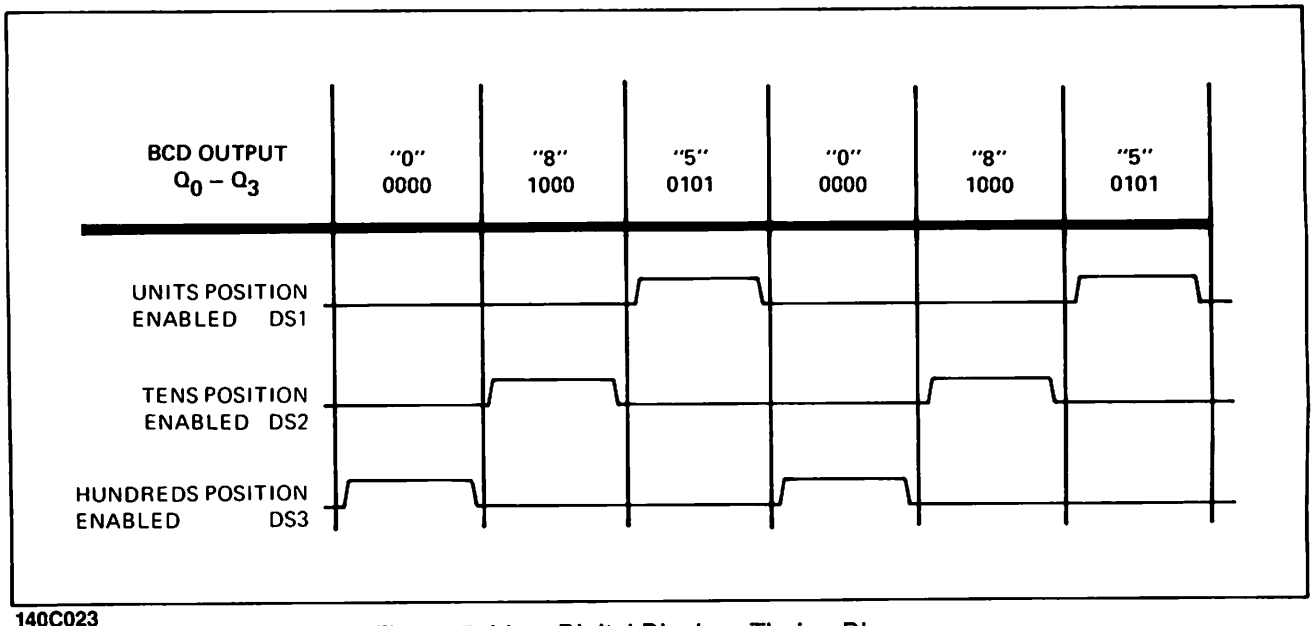
5.2.2 QUAD DISPLAY BOARD ASSEMBLY

The Quad Display Board Assembly contains the following circuits:

1. digital displays,
2. failsafe timer,
3. alarm gating,
4. air valve circuitry,
5. air pump circuitry,
6. mode select circuitry,
7. front panel switch circuitry, and
8. AC wiring and overpressure switch.

DIGITAL DISPLAYS Each display consists of a single binary counter driving three multiplexed 7-segment displays. The counter chip MC14553 provides the BCD output to drive the decoder and timing signals to multiplex the display.

When the microcomputer displays a number, it first activates the reset pin of the counter chip high (U1-13). This blanks the display and clears the internal counter. It then releases the reset line and sends a serial pulse train equal to the number to be displayed to the count input, pin 12. For example, if "085" is to be displayed, the microcomputer will send a pulse train containing 85



140C023

Figure 5-11. Digital Displays Timing Diagram

pulses. The counter chip will then continuously send a sequence of BCD coded "0", then "8", and then "5" to the decoder chip (7447). At the same time, using outputs DS1 through DS3, the counter chip will enable each display at the appropriate time so that a "0" will appear in the left digit, an "8" in the center, and a "5" in the right digit.

The MAP display decimal point is driven by transistor Q4 when the air valve is closed. This relationship is illustrated in Figure 5-11.

FAILSAFE TIMER The failsafe timer consists of two sections: the oscillator timer and the control section.

The oscillator is a 555 timer chip running at approximately 100 Hz. The output of this oscillator goes to the clock input of a CD4040 divider chip.

The Q12-1 output of the CD4040 (U7) goes to the alarm circuit and causes the alarm to sound when it is active (high).

When the monitor is powered up, U7 is reset by U10 (RESET0). Time elapsed from the reset of U7 to the terminal count is approximately three minutes. Under normal operation, the microcomputer resets U7 via U10 every 30 seconds, so that the terminal count is never reached. However, if the microcomputer fails or if the monitor is in the CAL mode, the microcomputer does not provide this reset signal. Consequently, the alarm sounds within three minutes of the failure.

ALARM GATING The alarm gating circuit can be thought of as a block with two inputs and two outputs as shown in Figure 5-12.

Both inputs can initiate an alarm. The alarm signal from the microcomputer goes through the Alarm switch. The failsafe signal goes directly to the alarm. The alarm LED serves two purposes: it flashes to indicate an alarm condition, and it remains lit if the Alarm switch is turned OFF.

The oscillator contains U8 and U10, which enable the alarm LED.

If an alarm situation occurs, pin 5 or 6 of U10 goes low. This forces pin 4 high, which enables the alarm oscillator and flashes the LED.

When an alarm condition is not present, both inputs to U10 (pins 5 and 6) are high. This drives pins 4 and 8 of U10 low, which disables the oscillator. The low signal out of U8 goes through the Alarm switch S2 to the base resistor of Q5 (R10). This low signal keeps the alarm LED normally OFF. When an alarm situation occurs, the oscillator output U8-6 pulses low and U8-2 pulses high, causing the alarm LED to blink.

When the Alarm switch is turned OFF, the output of the alarm oscillaor goes directly to the base resistor of Q5. The normally high oscillator output keeps the alarm LED lit, indicating that the Alarm switch is in the OFF position.

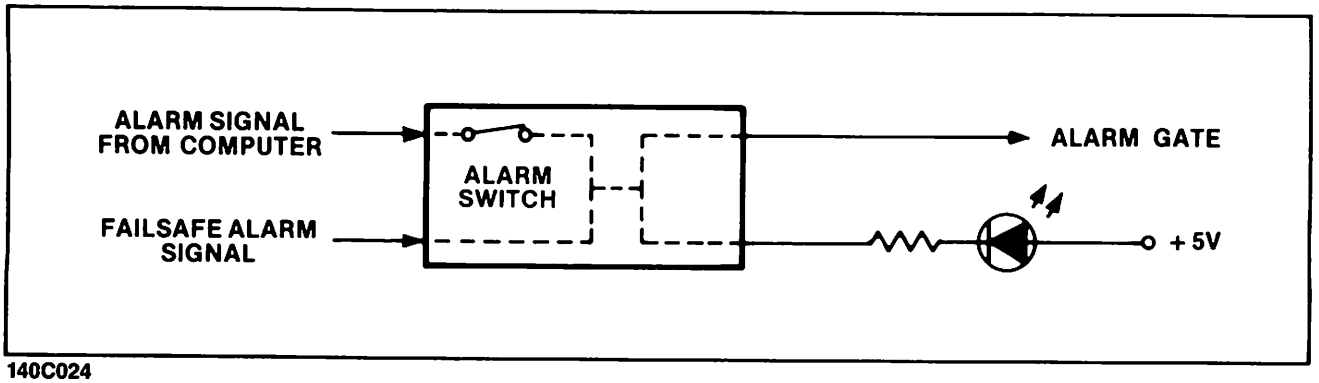
When the oscillator is enabled and the output pulses are low,the LED stops blinking.

The audio section of the alarm feature is controlled by the alarm gate U10-3.

When the microprocessor sends an alarm signal (up ALARM-0), the signal travels to two places: through U10-6 to start the oscillator, and through the alarm switch to U10-1. The latter drives U10-3 high, which signals the Control Logic Board to sound the alarm. If the Alarm switch is in the OFF position, U10-1 is tied high and is disconnected from the alarm signal input. If an alarm signal comes in under these conditions, the audible alarm does not sound; however, the LED blinks.

When the failsafe counter triggers an alarm signal, it enables the alarm oscillator allowing the signal to go directly to U10-2. This drives U10-3 high and sounds the alarm.

The alarm switch is not tied to this part of the circuit and has no effect on the alarm.



140C024

Figure 5-12. Alarm Gating Signal Flow Diagram

AIR VALVE CIRCUITRY The air valve used in the monitor normally is an open valve that operates with +12 VDC. The control line going from the microcomputer to the air valve circuit (air valve control) normally is high. This signal is inverted through U11, pins 13 and 12, which induces zero volts into the base of Q6. With Q6 disabled, the air valve remains open. To close the air valve, the microcomputer drops the control line low. This signal, inverted through U11, applies a high to the base of Q6. This turns Q6 on, which enables the air valve coil V1. The output of U11-12 also goes to the base of Q4. When the air valve is closed, the decimal point in the MAP window lights via Q4.

Diodes CR3 and CR7, in series, are placed across the air valve coil. They control the spike produced when the valve opens. Use of both diodes (CR3, CR7) speeds the valve operation.

AIR PUMP CIRCUITRY

☐ Air Pump Control, Models 845(A) and 845XT: The air pump used in the monitor operates with 120 AC. The AC drive is controlled by TRIAC Q7. The microcomputer enables the pump by making the air valve control signal low. This signal is inverted through U11, pins 11 and 10, sending a high signal to the inputs of two paralleled stages of U11, pins 5 and 9. These stages are paralleled to produce enough power to drive relay K1. When the outputs of U11 (pins 6 and 8) go low, relay K1 pulls, completing the gate circuit and activating Q7. C10 and R23 constitute a suppressor circuit that controls the spikes produced when the pump turns off and on.

NOTE

On the Model 845XT—IEC, the Transformer PWA contains the air pump relay driver circuit, the overpressure switch, and the voltage selection assembly.

☐ Air Pump Relay Driver Circuitry, Model 845XT—IEC: The air pump used in the monitor operates from 120 AC. The AC drive is controlled by solid state relay K1 on the Transformer PWA, which contains a bidirectional TRIAC. Since current only flows through the pump during one-half of the cycle, resistor R2 provides a zero crossover reference needed by the solid state relay to ensure correct operation. If R2 becomes open, the pump does not operate. The microprocessor enables the pump by making the pump control signal low (J2-16). This signal is inverted through U11, pins 11 and 10, sending a high signal to the input of transistor Q13. When the output of Q13 goes low, relay K1 completes the power circuit to the pump. C1 and R1, on the Transformer PWA, constitute a suppressor circuit that controls the spikes produced when the pump turns on and off.

MODE SELECT CIRCUITRY

The mode select circuitry provides the following functions:

1. generates and stores a signal (MODE) for the microcomputer, indicating the unit of measurement selected by the user.
2. provides the user with a visual indication — yellow LEDs (CR5 and CR6) — of the unit of measurement selected (mmHg or kPa).

☐ Model 845(A) Circuitry, Mode Select: The unit of measurement is selected by toggling the Manual Read switch S9 on the front panel to the UP position. This switch (S9) is connected to U9, which "de-bounces" the switch and stores the unit mode. When S9 is toggled, the clock input to the first section of U9-13 is enabled, and the high signal to the J&K inputs is closed through. When the Q output of the first section of the U9-15 goes high, it clocks the second section of U9 (clock input, pin 3).

The J&K inputs (pins 5 and 6) of the second section U9 are tied high. This action causes U9 to act as a "T" flip-flop, changing states each time the clock input is pulsed.

The first section of U9 is reset after approximately 50 milliseconds by C14, charging up through R28. Each time S9 is lifted and released, the first section of U9 clocks the second section of U9 and changes the unit of measurement. The Q and "Q not" outputs (pins 1 and 2) of the second section of U9 drive the indicator LED, using transistors Q8 and Q9 respectively. This signal (UP mode) indicates to the microcomputer the unit of measurement selected (low indicates kPa mode). This signal also goes to the decoder chip of the systolic and diastolic displays. It then goes to U8-11, which enables Q12, and illuminates the decimal points in the MAP, systolic, and diastolic windows.

When S9 is held down and released, the microprocessor's manual read line goes low. This low signal can cause various results depending on the status of the monitor.

☐ Model 845XT Circuitry, Mode Select: The unit of measurement is determined by a selector plug located internally on the rear lower left corner on the Quad Display Board. With the plug inserted in one direction in socket U9, pins 1 and 16 are connected; also pins 2 and 4. This applies +5V (logic 1) to R29, which turns Q8 on. This lights the mmHg LED on the front panel. Ground is applied to R30, causing Q9 to be off. This prevents kPa LED from illuminating and applies a logic 1 to the microcomputer mode line (J1-10), signaling the microcomputer that the mmHg mode is being used.

If the selector plug is removed from U9, rotated 180°, and reinstalled, the opposite mode is selected. Ground is applied to R29, and +5V is applied to R30. This causes Q8 to be off and Q9 to be on. The kPa LED illuminates and J1-10 becomes a logic 0.

U9-1 also goes to the decoder chip of the systolic and diastolic displays. It then goes to U8-11, which enables Q12, and illuminates the decimal points in the MAP, systolic, and diastolic windows.

When S9 is held down and released, the microprocessor's manual line goes low. This low signal can cause various results depending on the status of the monitor. The UP position of switch S9 has no function on the Model 845XT.

☐ Model 845XT—IEC Circuitry, Mode Select: The unit of measurement is selected by the kPa/mmHg switch S11 located internally on the front lower left corner of the Quad Display Board. When the switch is in the DOWN position, the readings display in mmHg; when the switch is in the UP position, readings display in kPa. It is necessary to remove the front panel to change the position of this switch.

Depending on the switch position, +5V are supplied through R31 or R32 to illuminate the selected LED. The signal goes to U8-11, which enables Q12, and illuminates the decimal points in the MAP, systolic, and diastolic windows.

FRONT PANEL SWITCH CIRCUITRY All front panel switches of the Models 845(A) and 845XT are mounted on the Quad Display Board Assembly. (The functions of these switches are described in Tables 2 and 3.)

However, on the Model 845XT—IEC, the Power ON/OFF switch is mounted directly on the monitor front panel. All other front panel switches of the Model 845XT—IEC are mounted on the Quad Display Board Assembly.

AC WIRING AND OVERPRESSURE SWITCH

☐ Models 845(A) and 845XT, AC Wiring and Overpressure Switch: AC power enters the monitor via the rear panel. The power line is grounded to the chassis. Power is routed through the fuse(s), then through the EMI line filter to the Power switch on the front panel.

One side of the AC line (J4-2) goes directly through the power switch S1 and to the transformer/voltage selector assembly. The other side (J4-1) goes through the overpressure switch via J6. From J4, the AC line signal goes (via J3, pins 8 and 7) through a thermal breaker located on the transformer core. It then continues on through the power switch to the transformer/voltage selector assembly.

☐ Model 845XT—IEC, AC Wiring and Overpressure Switch: AC power enters the monitor via the rear panel connector. The ground wire goes directly to ground after entering the chassis. The two voltage lines go through two fuses. The voltage lines enter the Transformer Board through the front panel switch assembly.

AC power is routed through the thermal breaker on the Transformer and back through the overpressure switch on the Transformer Board.

On the DINAMAP™ Monitor (all models), if the system air pressure goes above a preset level (275±10 mmHg/36.58±1.33 kPa), the overpressure switch interrupts the AC power, turning off the pump and opening the air valve, until the pressure drops. This action has no permanent effect on the monitor. The overall effect is similar to turning the Power switch off and then back on.

If the transformer overheats, the thermal breaker will open permanently and the transformer will have to be replaced.

The voltage selector assembly allows the DINAMAP™ Monitor to operate with inputs of 100V, 120V, or 240V, AC. By changing jumpers in this assembly, the voltage going to the pump will always be 120V. These jumpers also ensure that the correct voltages go to the +5V, +12V, and −12 V power supply inputs.

The air pump used in the DINAMAP™ Monitor has a diode (internally) in series with the field coil so that the armature provides the pump diaphram with half-wave power. This causes the armature to pulsate at a rate equal to the AC supply frequency.

5.2.3 TRANSFORMER BOARD ASSEMBLY (MODEL 845XT—IEC ONLY)

The Transformer Board Assembly contains the air pump control relay, the overpressure switch, and the voltage selection assembly for Model 845XT—IEC. (Refer to Section 5.2.2.)

5.2.4 POWER SUPPLY ASSEMBLY

The Power Supply Assembly contains three separate power supplies; +5V, +12V, and −12V.

All three power supplies are series-regulated, using a 3055 transistor as the pass element. Each supply uses a 2N4403 transistor controlled by an LM205 regulator I.C. to drive the pass element.

The +5V supply is current-limited to 2.5 amps by R1. The +12V and −12V supplies are limited to 0.75 amps by R11 and R21, respectively.

The Power Supply Assembly contains a hypo-hit reset circuit. This circuit holds the microcomputer in the RESET mode if the +5V supply drops below approximately 4.5V (newer models approximately 4.8V), or if the +12V supply drops below approximately 10V.

FETS Q30 and Q31, which are wired to the reset output pin 39, are normally on transistors. Unless FETS Q30 and Q31 are driven by a positive voltage from U30 (LM358), they automatically hold the microcomputer in a reset state. This allows the microcomputer to power up and power down in an orderly manner.

The control circuitry associated with U30 detects voltage dropouts as follows:

- CR30, R30, and C30 provide an isolated +5V reference, which is sent to the negative side of both comparators (U30).
- The +5V supply is taken to the positive input of one comparator. Under normal conditions, the voltage on pin 2 is one diode drop less than the voltage on pin 3. This condition keeps the output (pin 1) at a positive voltage, which keeps Q31 inactive. If the +5V supply drops, pin 3 is soon less positive than pin 2. This condition causes the output of U30 to go low, turning Q31 on.
- The +12V supply is divided through R32 and R33. The other half of U30 monitors the voltage level at the junction of R32 and R33 and acts in the same manner as Q31 previously discussed.

SECTION 6
MAINTENANCE

6.1 GENERAL

The only maintenance routinely required is that the monitor and accessories are kept clean, and are handled and used according to the instructions provided here and in the operation manual.

6.2 PREVENTIVE

The function of the pneumatic system can be affected by damage to air hoses, cuffs, or connectors through improper handling or dirt buildup. Before attempting any corrective maintenance, inspect the air hoses, cuff, and connectors to ensure that they are clean and undamaged.

6.3 CORRECTIVE

Occasionally, system failures occur due to malfunctions in the pneumatic system. Those most common malfunctions are leaks in the hose connections and dirt concentration in the air valve.

If an *external* leak in the pneumatic system is suspected, the technician should remove the cuff/hose assembly in question and should replace it with a new cuff/hose assembly.

Typically, the most common cause for an *internal* leak is a loose or punctured hose. Another common cause is a defective air valve. The air valve may malfunction if dirt is allowed to enter the system. Other causes for an internal leak include a leaking valve in the air pump or a leaky diaphram in the overpressure switch.

If an internal leak is suspected, the technician should:

1. Connect the calibration kit to the component in question.
2. Access the CAL mode. On the Model 845(A), the CAL mode is accessed by placing the Mode switch on the front panel in the CAL position. On the Models 845XT and 845XT—IEC, the CAL mode is accessed by first depressing and then holding momentarily the Manual switch and setting the Power switch to ON.
3. Wait approximately 10 seconds until a decimal point appears in the MAP window. This is an indication that the air valve has closed.
4. Using the mercury manometer and bulb, attempt to inflate the system to 200 mmHg. If the system inflates to 200 mmHg without decreasing more than 2 mmHg in 5 seconds, there is no leak. If the system does not inflate as described, isolate the defective component.
5. Remove and replace defective component.
6. Exit the CAL mode. On the Model 845(A), set the Mode switch in AUTO. On the Models 845XT and 845XT—IEC, switch the power OFF, then ON.
7. Recheck the monitor for normal operation.

6.3.1 PNEUMATIC SYSTEM WAVEFORM ILLUSTRATING COMMON MALFUNCTIONS

Pneumatic system failures affecting the analog voltage outputs are illustrated in the sample waveforms that follow. These waveforms were generated using a chart recorder. *It is not necessary to generate these waveforms when troubleshooting a pneumatic system failure.*

The waveform in Figure 6-1 illustrates a leaking air valve. At higher cuff pressures, the drop in pressure is more noticeable. In this case, the monitor was able to deflate normally once the pressure had decreased.

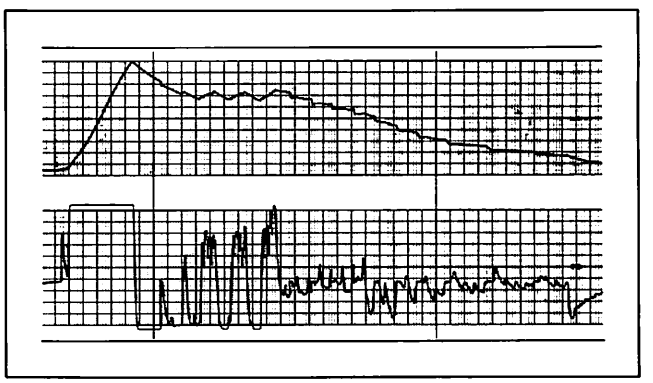


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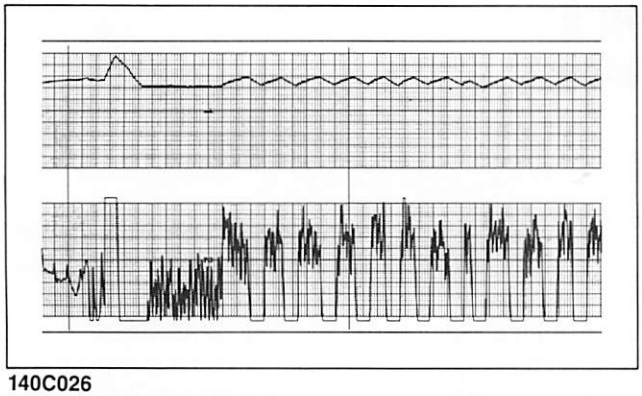
Figure 6-1. Waveform: Leaking Air Valve

The waveform in Figure 6-2 illustrates a very large leak in the pneumatic system.

In this situation, the leak causing the pressure drop is so large that the monitor cannot recover. As the monitor sensed the pressure drop, it pulsed the air pump to bring the pressure back up. Due to the magnitude of the leak, the air pump tried to pulse indefinitely in an effort to increase pressure.



140C026

Figure 6-2. Waveform: Pneumatic System Leak

The waveform in Figure 6-3 illustrates a very slow air valve. At lower pressures, the steps cannot be distinguished.

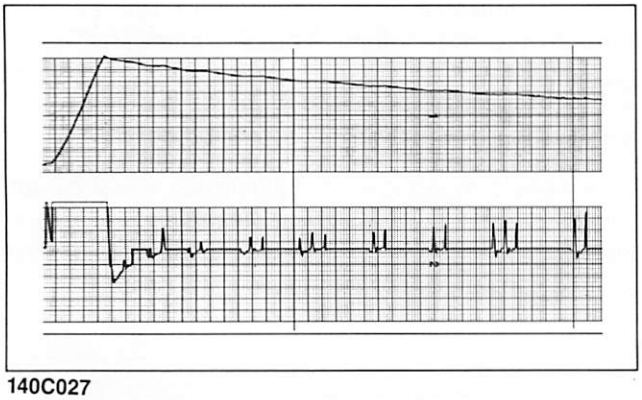


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Figure 6-3. Waveform: Slow Air Valve

The waveform in Figure 6-4 shows the effects of external artifacts (in this case, tapping the cuff) on cuff pressure and the integral signal.

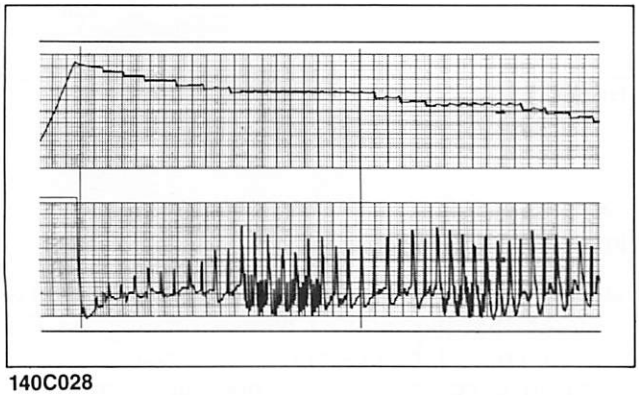

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Figure 6-4. Waveform: External Artifacts

SECTION 7
TROUBLESHOOTING

Table 6 addresses common technical problems that may cause system malfunctions. Carefully read this section before calling for assistance. Isolate all symptoms shown. If a problem still exists, call Critikon Field Engineering at 1-800-237-5591 for assistance; in Florida, call 1-813-887-2000. Servicing should be performed by qualified personnel only.

7.1 TOOLS FOR ADJUSTMENTS

The monitor can be adjusted using standard screwdrivers.

TABLE 6. TROUBLESHOOTING GUIDE

Symptom	Probable Cause	Response
Digital displays do not light even though kPa or mmHg indicator is lit.	Microcomputer section is malfunctioning, or power supply voltages are out-of-limits.	Verify that the +12V, −12V, and 5V test points on the Control Logic Board Assembly have the indicated voltages ±5% (refer to Table 5). If they do, replace Control Logic Board Assembly. If the above readings are not obtained, replace Power Supply Board.
Digital displays flash alternating 000s and 888s.	Power supply voltage is out-of-limits.	Access the CAL mode. Verify power supply voltages as follows: If the MAP display reads below 123 or above 133, check the +5V. If the reading is between +4.85V and +5.15V, replace Control Logic Assembly. If +5V is out-of-limits, adjust Power Supply Assembly, or replace it. If the MAP voltages level is acceptable, continue with these instructions. If the HEART RATE display reads below 132 or above 139, replace the Control Logic Board Assembly. If the Heart Rate voltage level is acceptable, continue on.
*SYSTOLIC and DIASTOLIC display readings may be transposed in certain software revisions. Refer to Table 5, Power Supply voltages.		If the SYSTOLIC display reads below 139 or above 151, check the +12V*. If the reading is between +11.64V and +12.36 V, replace the Control Logic Board Assembly. If the +12V is out-of-limits, adjust the Power Supply Assembly or replace it. If the SYSTOLIC voltage level is acceptable, continue on. If the DIASTOLIC display reads below 44 or above 59, check the −12V*. If the reading is between −11.64V and −12.36, replace the Control Logic Board Assembly. If the −12V is out-of-limits, adjust the Power Supply Assembly or replace it.

TABLE 6. TROUBLESHOOTING GUIDE (Cont'd)

Symptom	Probable Cause	Response
Normal operation is achieved, but the audible alarm is not heard during alarm condition with the Alarm switch ON.	Audio alarm driver defective, or rear panel-to-Control Logic Board connector not secure. Malfunction of Quad Display Board or interconnect cables.	Check Control Logic Assembly connector. Check for broken or bent pins. Check D.I.P. ribbon cables to Quad Display Assembly. Check rear panel speaker for continuity ($\approx$ 4 ohms). If same problem is observed after verifying the points above, replace Control Logic Board Assembly. If problem still persists after replacing the Control Logic Board Assembly, replace Quad Display Assembly.
Pump is permanently disabled, or runs continuously.	Pump will malfunction if the connector going to the pump is not secured. Pump will run continuously if the pump control circuitry is defective.	Check all connector placements. Check for broken pins. Make sure all connectors are secure. If problem still persists, replace Quad Display Assembly and/or Control Logic Board Assembly.
Some or all digital displays always read zero. **NOTE:** All 888s displayed at initial power-up is a normal operating condition.	Analog pressure channel inactive.	Replace Control Logic Board Assembly.
Unit functions properly, but the determination time is slower than normal.	Defective filter clamp control circuit in analog channel.	Replace Control Logic Board Assembly.
The pump does not turn ON/OFF as required, and/or values displayed are erroneous. Digital displays go out completely at random.	Malfunctions in the microcomputer circuit.	Replace Control Logic Board Assembly.

SECTION 8
CALIBRATION (CAL)

8.1 GENERAL

DINAMAP™ monitors are calibrated at the factory prior to shipment. However, after operation, occasional adjustment may be required to ensure accurate readings on the displays. This section describes the purpose of calibration (CAL), the verification of calibration using the display windows, and calibration adjustments by means of the trimpots on the Control Logic Board Assembly and the Power Supply Assembly.

Calibration adjustments should be made only if the monitor fails to meet the requirements defined in Section 8.3, Verification of Calibration, and should be performed by qualified technicians only. Verification should be performed at least once a month or whenever there is doubt that the monitor is functioning properly.

Trimpots on the Control Logic Board Assembly provide for adjustments of Zero Offset, Gain and Integral Offset; trimpots on the Power Supply Assembly provide for the adjustments of +5V, +12V, and −12V.

8.2 PURPOSE OF CALIBRATION

8.2.1 ZERO OFFSET

The purpose of the zero offset adjustment is to shift slightly the entire cuff measurement process in the positive direction. This adjustment allows room for the transducer output to drift negative or positive without disabling the auto zero scheme.

When the monitor is in the CAL mode, the cuff pressure output is sent through the multiplexer and the A/D converter, and the number displayed is the zero offset value for the existing operating temperature and calibration of the monitor. This is an arbitrary number that the internal microcomputer uses in the automatic calibration routine. The nominal value selected for this display is 015.

8.2.2 GAIN (FULL SCALE ADJUSTMENT)

The gain (full scale adjustment) trimpot adjusts the DC offset from the first stage amplifier by injecting a voltage into the input of the second stage operational amplifier. The purpose of this adjustment is to obtain a voltage that corresponds to the pressure supplied by the manometer.

8.2.3 INTEGRAL OFFSET

The purpose of the integral adjustment is to ensure that the DC bias point of the nonlinear amplifier is set to approximately +3.0V. If this voltage varies more than ±0.25V, it is possible that a larger signal will be distorted when passing through this amplifier and affect the accuracy of the determination. The windows display a number corresponding to the analog integral offset converted to digital units. The number selected for this parameter is 077±3.

8.2.4 POWER SUPPLY VOLTAGES

Three trimpots on the Power Supply Assembly provide for the adjustment of the +5, +12, and −12 voltages to within their acceptable tolerances.

8.3 VERIFICATION OF CALIBRATION

Verification and adjustment of calibration requires that the monitor be in the CAL mode. On the Model 845(A), the CAL mode is accessed by putting the Mode switch in the CAL position. On Models 845XT and 845XT—IEC, the CAL mode is accessed by first depressing and then holding momentarily the Manual switch while switching the Power switch to ON.

NOTE

Values to be verified referenced herein are in millimeters of mercury (mmHg). If values to be verified are in kilopascals (kPa), multiply the mmHg values by 0.133, e.g., 100 mmHg = 13.3 kPa.

8.3.1 ZERO OFFSET

1. Disconnect one of the cuff air hoses from the rear of the monitor to ensure there is no air in the cuff.
2. Set the monitor in the CAL mode.
3. After approximately 10 seconds, all windows display a number. In addition, the MAP window displays a decimal point/one dot. This indicates the deflation valve is closed. The same number displays in all four windows; this number should be between 005 and 025. The optimum display is 015.

   If the zero offset value is below 005 or above 025, the DINAMAP™ Monitor should be adjusted as described in Section 8.4.1, Zero Offset Adjustment.

If the number displayed is between 005 and 025, continue verification by proceeding to Section 8.3.2, Gain.

8.3.2 GAIN

1. Connect a mercury manometer to the monitor's pneumatic system on the rear panel; use the 3-port "T" adapter furnished with the monitor to "tie in" the manometer. See Figure 8-1, Mercury Manometer to Rear Port Connection.
2. Wrap the cuff around itself so that it can be inflated.
3. Set the monitor in the CAL mode.
4. Approximately 10 seonds later, the zero offset value appears in all four windows. Note this number for future use.
5. Using the manometer bulb, inflate the system to 200 ±1 mmHg. The numbers displayed should indicate 200 plus the zero offset noted ±4 mmHg. For example, if the zero offset value displayed was 015, the numbers displayed should indicate 215 ±4 mmHg (28.6 ±0.5 kPa).

NOTE

During calibration or verification of gain, the difference between the mercury manometer reading and the monitor's readings will be the zero offset value ±2 mmHg (0.27 kPa).

6. Slowly reduce the system pressure and check the reading at several points, for example, 150, 100, and 050. Verify that at each checkpoint the display shows the system pressure plus the zero offset value ±4 mmHg (0.54 kPa).

If the numbers displayed do not match the sum of the manometer pressure and the zero offset, the monitor should be adjusted as described in Section 8.4.2, Gain Adjustment.

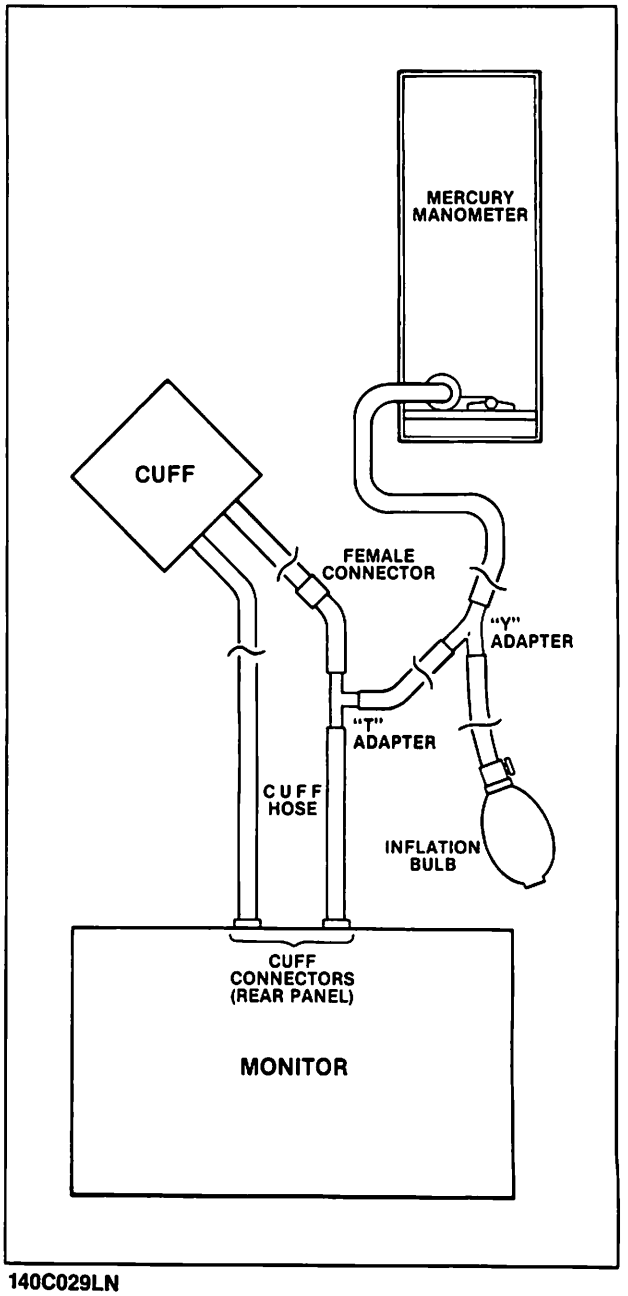
8.3.3 INTEGRAL OFFSET

1. Disconnect one of the cuff air hose connections.
2. Set the monitor in the CAL mode.
3. Depress and hold down the Manual switch. A number between 074 and 080 should display in the MAP window. The optimum display is 077.

If the integral offset value is below 074 or above 080, the monitor should be adjusted as described in Section 8.4.3, Integral Offset Adjustment.

8.4 CALIBRATION ADJUSTMENTS

Calibration adjustments can be made with a screwdriver. When making adjustments, proceed slowly and



140C029LN

Figure 8-1. Mercury Manometer to Rear Port Connection

carefully. The monitor has been calibrated at the Critikon facility and, therefore, only minor adjustments (a slight turn in either direction on the trimpots) should be required to obtain the desired display. After making *any* adjustment, verify all calibrations.

8.4.1 ZERO OFFSET ADJUSTMENT

To verify the zero offset value, follow the instructions outlined in Section 8.3.1. If a zero offset adjustment is required, adjust trimpot R15 labeled ZERO (on the Control Logic Board Assembly) until a readout of 015 is obtained on all four displays.

8.4.2 GAIN ADJUSTMENT

To verify gain, follow the instructions outlined in Section 8.3.2. If a gain adjustment is required, adjust trimpot R11 labeled F.S. ADJ. (on the Control Logic Board Assembly) to obtain proper calibration while a mercury manometer is connected to the monitor's pneumatic system.

8.4.3 INTEGRAL OFFSET ADJUSTMENT

To verify the integral offset value, follow the instructions outlined in Section 8.3.3. If an integral adjustment is required, adjust trimpot R33 labeled OFFSET 1 (on the Control Logic Board Assembly) while in the CAL mode, until a readout of 077 is obtained on all four displays.

8.4.4 POWER SUPPLY VOLTAGE ADJUSTMENT

1. Disconnect the DC power connector (P10) from the Control Logic Assembly.
2. Connect the digital voltmeter to the Power Supply Assembly test points, turn power ON and adjust as follows:

TEST POINTS	ADJUST	DVM READING
+ -- + 5V -- -	R4	+ 5.00 ±0.05V
+ -- +12V -- -	R14	+12.00 ±0.12V
+ -- −12V -- -	R24	−12.00 ±0.12V

3. Set the Power switch to OFF.
4. Reconnect the DC power connector (P10) to the Control Logic Assembly.
5. Check the Control Logic Assembly +5V, +12V, and −12V test points. Voltages should be +5 ±0.5V, +12 ±0.12V, and −12 ±0.12V.
6. Check the −5V test point on the Control Logic Assembly. Voltage should be −5.00 ±0.25V.
7. Connect the voltmeter between A/D 5V test point (TP10) and GND test point and adjust R63 to obtain a reading of +5.00 ±0.01VDC.

8.5 AIR VALVE FLOW RATE TEST

To verify that the air valve is free of contamination and opens fully:

1. Connect adult cuff to the monitor to be tested. Insert a calibration "T" between the cuff air hose and the transducer port on the monitor (left-hand port when facing the unit from the front). See Figure 8.2, Air Valve Flow Rate Test.
2. Wrap the cuff around a 3.0 ±0.1-inch rigid cylinder. Line up the white band at the end of the cuff with the white band inside the cuff. The cuff will be slightly loose at this point.

NOTE

Three-inch (diameter) rigid plastic cylinders, rods, and tubes are available in PVC, ABS, or plexiglass from practically all plastic outlets.

3. Connect a mercury manometer to the calibration "T".
4. Start a determination. When the pump turns off after reaching its initial pump-up pressure, turn off the monitor's AC power. This step seats the cuff and opens any folds present in the cuff bladder.
5. After system pressure reaches 0 mmHg, start another determination. When the pump turns off after reaching the initial pump-up pressure of 170 mmHg and before the system begins to deflate, turn off the monitor's AC power. The pressure should bleed from 170 mmHg to less than 4 mmHg in less than 10 seconds.
6. If deflation requires more than 10 seconds, the air line between the cuff and the dump valve outlet is obstructed and must be cleared to ensure the accuracy of the displayed parameters.

8.6 FAILSAFE ALARM TEST

1. Place the unit into the CAL mode.
2. Place the Alarm switch in the OFF position.

The alarm should sound within four minutes.

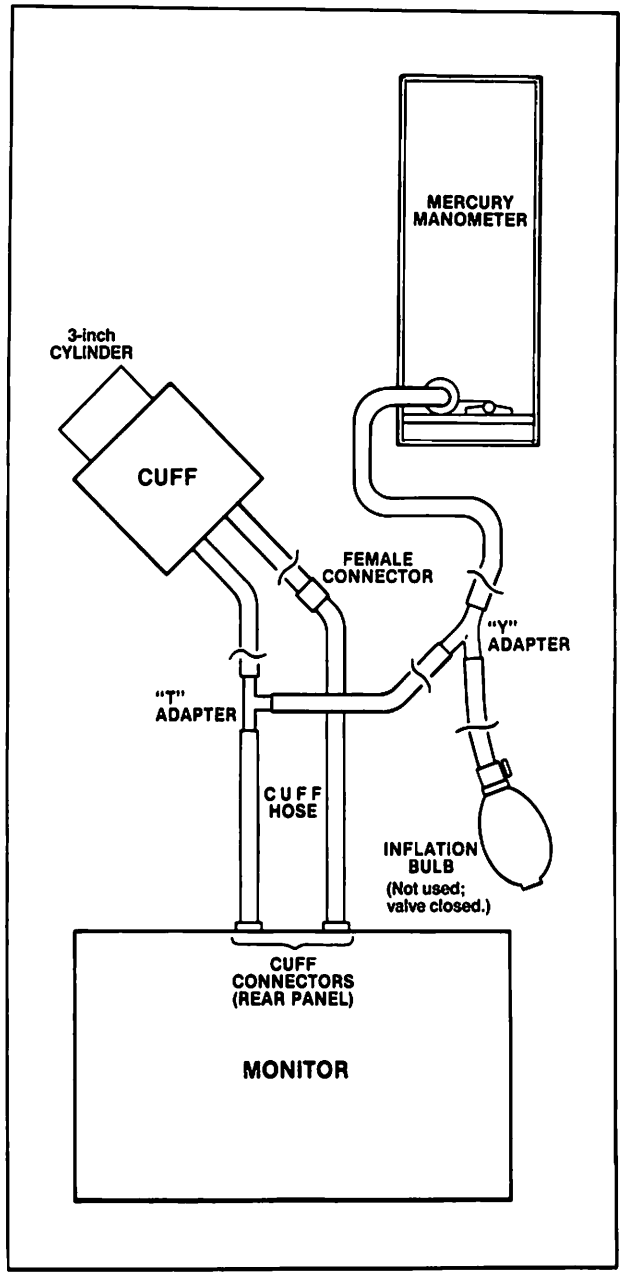


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Figure 8-2. Air Valve Flow Rate Test

APPENDIX A

Technical Specifications A1-A4

APPENDIX A

Technique	Measures mean arterial pressure (MAP), systolic and diastolic pressure, and heart rate by the oscillometric method. MAP is determined by the microcomputer to be the minimum cuff pressure at which maximum pressure pulsations are found. Adaptive programs reject most artifacts and compensate automatically for a wide range of patient variables.
Cuff Inflation Pressure	Automatically and adaptively determined between 60 and 230 mmHg (nominal). Released automatically if pressure exceeds 275 mmHg (nominal) or if AC power fails.
Cuff Inflation Rate	Maximum cuff inflation pressure established in 2 to 6 seconds depending on cuff size.
Cuff Deflation Rate	Typically 30 seconds, varies with heart rate and blood pressure, controlled by the microcomputer.
Digital Displays	Four 3-decimal digits, 0.43 inches high, high intensity red LEDs. Readout is selectable in mmHg or kPa.
Audible Alarm Functions	High Frequency, low frequency, or alternating frequency audible alarm with adjustable volume. Brief alarm test at power turn-on; 6-second alarm for no determination; and a 3-minute alarm for most system failures. Pulsating alarm with alternating zeros and eights on displays for out-of-limits voltage levels.
Alarm Limits	Automatically preset at power turn-on at 140 mmHg high and 50 mmHg low. May be reset by a front panel Alarm switch in 5 mmHg increments between 70 and 200 mmHg for the high limit, and 25 and 120 mmHg for the low limit. Out-of-limit conditions cause a 6-second audible alarm for each out-of-limit determination. **Alarms only on MAP levels.**
Alarm Indicator	A red LED indicates audible alarm turned off. A flashing LED indicates alarm condition.
Mode Switch	Selects automatic operation or hold mode.
Operating Cycle	Adjustable from one minute to 16 minutes (nominal) on Model 845(A), and from one minute to 160 minutes (nominal) on Models 845XT and 845XT—IEC between cuff inflations.
Pressure Connection	Positive lock quick disconnect fittings on cuff hose.
Auto Zero	Microcomputer automatically establishes the zero pressure reference before each determination.
Accessory Connector	Rear panel connector provides 5 outputs and key test points: 1 output, 300 BAUD Serial ASCII, formatted for the Critikon Trend Recorder/Printer; and 4 binary outputs for MAP, systolic, diastolic, and heart rate readings. **Note:** IEC Models: Voltages exceeding 2VRMS should not be applied to the connector.
Pressure Cuff	Standard adult Baumanometer* V-LOK Cuff, fitted with positive lock fittings and 12-foot dual air hose. Optional 24-foot dual air hose and other cuff sizes available.

APPENDIX A (cont'd)

Cleaning	Wipe with sponge dampened with normal hospital bactericides.
Operating Temperature	59° to 104° F; 15° to 40° C.
Storage Temperature	−15° to 180° F; −26° to 82° C.
Humidity	Normal room; 0%-95% Relative Humidity (noncondensing)
Power Requirements (All Models)	0.35 amp 120V; 0.44 amp 100V; 0.17 amp 220/240V; 50 Hz or 60 Hz.
Input Voltage (All Models)	90-110VAC; 108-132VAC; 198-264VAC; 50 Hz or 60 Hz.
Power Cable	3-prong, 3-wire, hospital grade connector and 8-foot cord (Domestic only). **Note:** On international/845XT—IEC models, power cable assembly, P/N 320-193, is supplied. The connector that connects to the power source must be attached by a qualified technician.
Fuse (Fuse values shown for reference only; refer to rear panel for fuse rating.)	1 amp, 3AG SB for 100 or 120VAC; 1/2 amp, FST for 240VAC **Note:** On Model 845XT—IEC, 0.5 amp 250V, 3AG SB for 100V or 120V; 0.2 amp 250V, FTT for 220/240V.
Leakage Current	Less than 100 microamps.
Mountings	Self-supporting on rubber feet, or permanent attachment to optional stand or vertical pole clamp. Heavy duty carrying handle.
Color	Dark blue case with light blue front panel.
Size	Height: 4.75 inches 12.0 cm Width: 11.25 inches 28.6 cm Depth: 11.25 inches 28.6 cm
Weight	16.5 pounds (7.5 kg)

*Registered trademark of W. A. Baum Co., Inc.

APPENDIX B

Technical Drawing Package B1-B85

APPENDIX B

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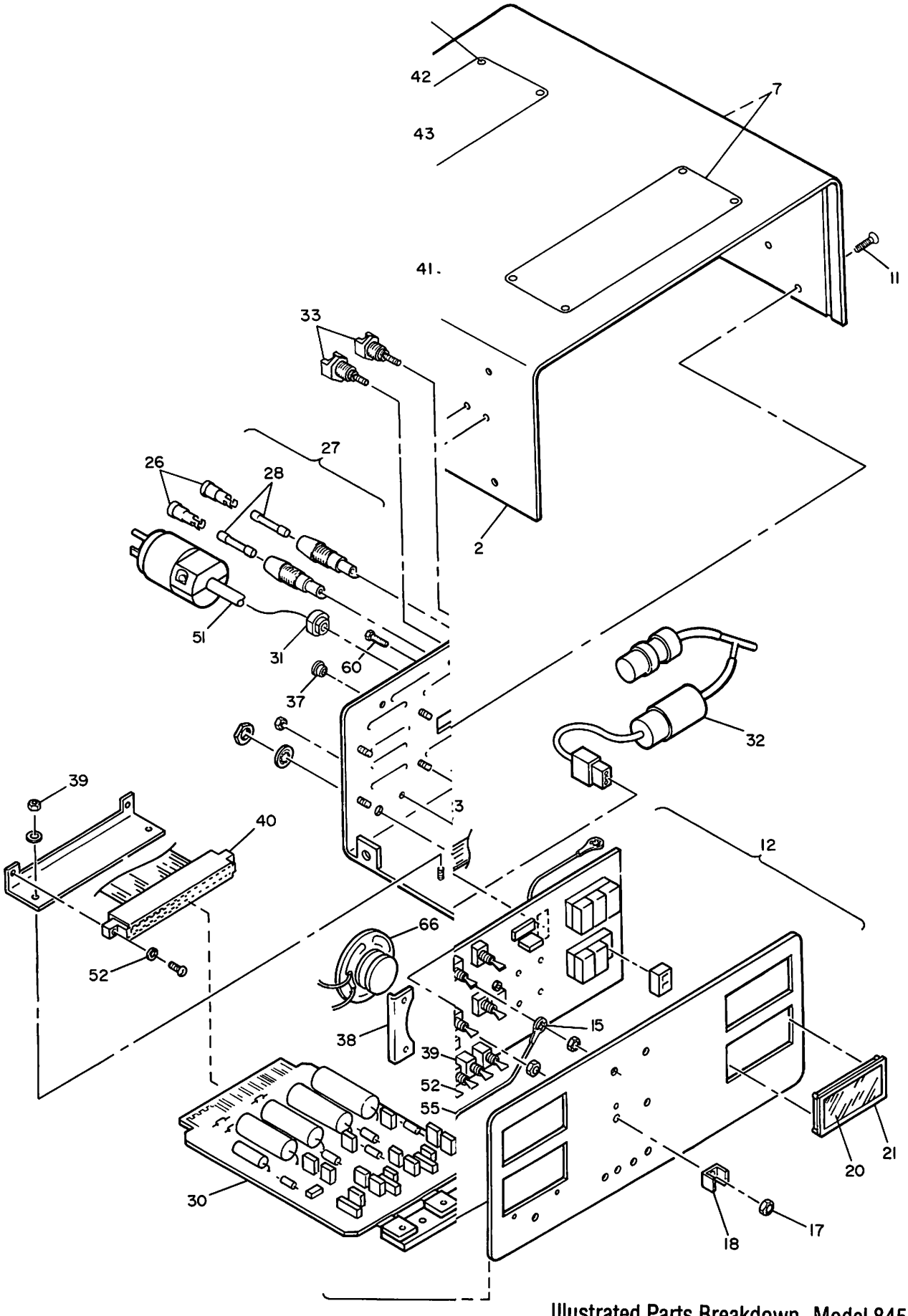

Illustrated Parts Breakdown, Model 845(A)

140C031

MODEL 845(A) PARTS LIST

Item No.	Part No.	Description	Units per Assy.
1	334-006	Cover Assembly — ENGLISH	1
		Cover Assembly — INTERNATIONAL 240V/50Hz, 100V/50Hz	
	or		
	334-007	Cover Assembly — GERMAN	1
	or		
	334-008	Cover Assembly — DUTCH	1
	or		
	334-009	Cover Assembly — FRENCH	1
2	703-105	Cover	1
3	724-103	Washer, Lock Split Ring No. 8	4
4	727-101	Fastener, Snap Stud	4
5	715-109	Nut, Reg 8-32 SS	4
6	732-103	Handle with Hardware	1
7	729-223	Plate, Auto Mode Inst. 100V	2
	or		
	729-224	Plate, Auto Mode Inst. — GERMAN	2
	or		
	729-225	Plate, Auto Mode Inst. — DUTCH	2
	or		
	729-226	Plate, Auto Mode Inst. — FRENCH	2
8	729-135	Label, Danger Explosion Hazard	1
9	727-120	Rivet, Type N SSP-43	12
10	727-111	Rivet, Pop 1/8 Dia.	2
11	722-121	Screw, Flt-Hd 8-32 x 3/8	4
12	332-006	Front Panel and Quad Display Board Assy. — ENGLISH	1
	or		
	332-008	Front Panel and Quad Display Board — International 240V/50Hz	1
	or		
	332-010	Front Panel and Quad Display Board — German 240V/50Hz	1

MODEL 845(A) PARTS LIST (Cont'd)

Item No.	Part No.	Description	Units per Assy.
	or		
12	332-012	Front Panel and Quad Display Board 100V/50Hz	1
	or		
	332-014	Front Panel and Quad Display Board — DUTCH 240V/50Hz	1
	or		
	332-016	Front Panel and Quad Display Board — FRENCH 240V/50Hz	1
13	315-017	Quad Display Assembly	1
14	680-126	Wire, 18 AWG Green	0.458 ft.
15	734-114	Terminal, Gnd Lug Locking	1
16	734-112	Terminal, Gnd Lug Locking	1
17	716-101	Nut, Decorative 1/4 x 40 mm	10
18	733-102	Guard, Alarm Switch	1
19	701-105	Front Panel — ENGLISH	1
	or		
	701-106	Front Panel — GERMAN	1
	or		
	701-107	Front Panel — DUTCH	1
	or		
	701-108	Front Panel — FRENCH	1
20	733-105	Lens, Red Filter	4
21	733-108	Bezel, Black	4
22	601-108	Ribbon Cable Assy., 16 Pin Dip 5 inch	1
23	601-109	Ribbon Cable Assy., 16 Pin Dip 7 inch	1
24	336-006	Chassis Assy., 120V	1
	or		
	336-008	Chassis Assy., 240V	
	or		
	336-010	Chassis Assy., 110V	1

MODEL 845(A) PARTS LIST (Cont'd)

Item No.	Part No.	Description	Units per Assy.
25	702-104	Chassis	1
26	752-108	Fuseholder Cap, 3AG Gray (for 120/100V units)	2
	or		
	752-109	Fuseholder Cap, FST Black (for 240V units)	2
27	617-104	Fuseholder with Hardware	2
28	628-102	Fuse, 1 amp 250V Slo-Blo (for 120/100V units)	2
	or		
	628-107	Fuse, 1/2 amp 250V Slo-Blo 5 x 20 mm FST (for 240V units)	2
29	618-103	Filter, 6A, 250V 0.15-20 MHz	1
30	315-008	Power Supply Assembly	1
31	752-120	Strain Relief, Line Cord	1
32	330-009	Air Supply Harness Assy.	
33	712-140	Connector, Bulkhead Chrome	2
34	716-102	Nut, Hex 7/16 Brass	2
35	736-112	Clamp, Plastic "C" 1 inch	1
36	736-107	Clip, Locking Adhesive Back	1
37	732-117	Plug, 3/8 Hole	1
38	704-140	Clip, Speaker Mounting	2
39	715-103	Nut, Hex 6-32 x 1/4 SS	6
40	320-016	Connector, Power Supply	1
41	721-101	Screw, Nylon 6-32 x 3/8	3
42	735-145	Standoff, Female Swivel	3
43	725-103	Washer, Nylon 0.150 ID, 5/16 OD	6
44	735-136	Spacer, Nylon Thread 6 x 3/4	2
45	735-132	Spacer, MF 1/4 x 2.5 w 6-32 thd	2
46	719-111	Screw, Mach Phil 6-32 x 3/8	5
47	300-544	Control Logic Assembly	1
	or		
	300-545	*See Note 1.*	

MODEL 845(A) PARTS LIST (Cont'd)

Item No.	Part No.	Description	Units per Assy.
48	719-122	Screw, Mach, Pan Hd 10-32 x 1/2	4
49	723-105	Washer, Flat Std No. 10 SS	7
50	724-104	Washer, Lock Split Ring No. 10	4
51	320-019	Power Cable Assembly, 120V	1
	or		
	316-018	Power Cable Assembly, 100V	1
	or		
	316-020	Power Cable Assembly, 240V	1
52	724-102	Washer, Lock Split Ring No. 6	6
53	715-107	Nut, Hex 4-40	4
54	724-101	Washer, Lock Split Ring No. 4	4
55	723-104	Washer, Flat No. 8	2
56	716-106	Nut, Self-Locking No. 8	3
57	724-103	Washer, Lock Split Ring No. 8	3
58	732-113	Foot, 0.5 inch Bump-On	4
59	715-109	Nut, Hex 8-32 Std. Pattern	6
60	722-110	Screw, Sub — D Min. Conn.	2
61	320-014	Conn. Assy., Rear Panel	1
62	664-118	Switch, SPDT CNTR-OFF	1
63	630-103	Pot, 100K, 1 Turn	1
64	682-107	Cable Assy., 16 inch	1
65	734-114	Terminal, Gnd Lug Locking	1
66	600-102	Speaker, 2 inch	1
67	722-120	Stud, 8-32 UNC 1-1/4 SS	3
68	320-015	Pump Transformer Assembly	1
69	320-017	Air Pump	1
70	320-007	Transformer Assembly	1
71	704-350	Bracket, Flange Pump Mtg.	1
72	710-102	Mount, Barry Ball	3
73	735-134	Spacer, Threaded 1/4 x 1/4 w 6-32 thd	4
74	719-112	Screw, Pan Hd 8-32 x 3/8	5
75	724-103	Washer, Lock No. 8	4
76	724-104	Washer, Flat No. 8	4

MODEL 845(A) PARTS LIST (Cont'd)

Item No.	Part No.	Description	Units per Assy.
77	715-109	Nut, Hex 8-32	51
78	719-130	Screw, Mach Pan Hd 6-32 x 1	4
79	724-102	Washer, Lock No. 6	4
80	715-103	Nut, Hex 6-32 x 1/4 SS	4
81	734-112	Terminal, Gnd Lug Locking	2
82	680-126	Wire, Green 18 AWG	0.166 ft.

Note 1: 300-544 contains software that makes the DINAMAP™ Monitor, Model 845(A), compatible with the Model 950 Trend Recorder/Printer.

300-545 contains software that makes the DINAMAP™ Monitor, Model 845(A), compatible with the Model 1900 Trend Recorder/Printer.

MODEL 845XT PARTS LIST

Item No.	Part No.	Description	Units per Assy.
1	334-033	Cover Assembly — DOMESTIC	1
2	703-105	Cover	1
3	724-103	Washer, Lock Split Ring No. 8	4
4	727-101	Fastener, Snap Stud	4
5	715-109	Nut, Reg 8-32 SS	4
6	732-103	Handle with Hardware	1
7	729-523	Plate, Auto Mode Inst., ENGLISH	2
8	729-135	Label, Danger Explosion Hazard	1
9	727-120	Rivet, Type N SSP-43	12
10	727-111	Rivet, Pop 1/8 Dia.	2
11	722-121	Screw, Flt-hd 8-32 x 3/8	4
12	332-076	Front Panel and Quad Display Board Assy. — DOMESTIC	1
13	315-146	Quad Display Assembly	1
14	680-126	Wire, 18 AWG Green UL	0.458 ft.
15	734-114	Terminal, Gnd Lug Locking	1
16	734-112	Terminal, Gnd Lug Locking	1
17	716-101	Nut, Decorative 1/4 x 40 mm	10
18	733-102	Guard, Alarm Switch	1
19	701-173	Front Panel Assembly	1
20	733-105	Lens, Red Filter	4
21	733-108	Bezel, Black	4
22	601-108	Ribbon Cable Assy., 16 Pin Dip 5 inch	1
23	601-109	Ribbon Cable Assy., 16 Pin Dip 7 inch	1
24	336-006	Chassis Assy., 120V	1
	or		
	336-008	Chassis Assy., 240V	1
25	702-104	Chassis	1
26	752-108	Fuseholder Cap, 3AG Gray (for 120/100V units)	2
	or		
	752-109	Fuseholder Cap, FST Black (for 240V units)	2
27	617-104	Fuseholder with Hardware	2

MODEL 845XT PARTS LIST (Cont'd)

Item No.	Part No.	Description	Units per Assy.
28	628-102	Fuse, 1 amp 250V Slo-Blo (for 120/100V units)	2
	or		
	628-107	Fuse, 1/2 amp 240V Slo-Blo 5 x 20 mm FST (for 240V units)	2
29	618-103	Filter, 250V 0.15-20 MHz	1
30	315-008	Power Supply	1
31	752-120	Strain Relief, Line Cord	1
32	330-009	Air Supply Harness Assy.	1
33	712-140	Connector, Bulkhead Chrome	2
34	716-102	Nut, Hex 7/16 Brass	2
35	736-112	Clamp, Plastic "C" 1 inch	1
36	736-107	Clip, Locking Adhesive Back	1
37	732-117	Plug, 3/8 Hole	1
38	704-140	Clip, Speaker Mounting	2
39	715-103	Nut, Hex 6-32 1/4 SS	6
40	320-016	Connector, Power Supply	1
41	721-101	Screw, Nylon 6-32 x 3/8	3
42	735-145	Standoff, FEM Swivel	3
43	725-103	Washer, Nylon 0.150 ID, 5/16 OD	6
44	735-136	Spacer, Nylon Thread 6 x 3/4	2
45	735-132	Spacer, MF 1/4 x 2.5 w 6-32 thd	2
46	719-111	Screw, Mach Phil 6/32 x 3/8	5
47	300-548	Control Logic Assembly	1
	or		
	300-549	*See Note 1.*	
48	719-122	Screw, Mach, Pan Hd 10-32 x 1/2	4
49	723-105	Washer, Flat Std No. 10 SS	7
50	724-104	Washer, Lock Split Ring No. 10	4
51	316-019	Line Cord 120V	1
	or		
	316-020	Line Cord 240V	1

MODEL 845XT PARTS LIST (Cont'd)

Item No.	Part No.	Description	Units per Assy.
52	724-102	Washer, Lock Split Ring No. 6	6
53	715-107	Nut, Hex 4-40	4
54	724-101	Washer, Lock Split Ring No. 4	4
55	723-104	Washer, Flat No. 8	2
56	716-106	Nut, Self Locking No. 8	3
57	724-103	Washer, Lock Split Ring No. 8	3
58	732-113	Foot, 0.5 inch Bump-On	4
59	715-109	Nut, Hex 8-32 Std. Pattern	6
60	722-110	Screw, Sub — D Min. Conn.	2
61	320-014	Conn. Assy., Rear Panel	1
62	S1 664-118	Switch, SPDT CNTR-OFF	1
63	R1 630-103	Pot. 100K 1 Turn	1
64	682-107	Cable Assy., 16 inches	1
65	734-114	Terminal, Gnd Lug Locking	1
66	600-102	Speaker 2	1
67	722-120	Stud, 8-32 UNC 1-1/4 SS	3
68	*See Note 2*	Pump Transformer Assembly	1
69	320-017W	Air Pump	1
	or		
	320-173	Air Pump (domestic)	
70	320-007	Transformer Assembly	1
71	704-350	Bracket, Flange Pump Mtg.	1
72	710-102	Mount, Barry Ball	3
73	735-134	Spacer, Threaded 1/4 x 1/4 w 6-32 Thd.	4
74	719-112	Screw, Pan Hd 8-32 x 3/8	5
75	724-103	Washer, Lock No. 8	4
76	724-104	Washer, Flat No. 8	4
77	715-109	Nut, Hex 8-32	5
78	719-130	Screw, Mach Pan Hd 6-32 x 1	4
79	724-102	Washer, Lock No. 6	4

MODEL 845XT PARTS LIST (Cont'd)

Item No.	Part No.	Description	Units per Assy.
80	715-103	Nut, Hex 6-32 x 1/4 SS	4
81	734-112	Terminal, Gnd Lug Locking	2
82	680-126	Wire, Green 18 AWG UL	0.166 ft.

Note 1: 300-548 contains software that makes the DINAMAP™ Monitor, Model 845XT compatible with the Model 950 Trend Recorder/Printer.

300-549 contains software that makes the DINAMAP™ Monitor, Model 845XT compatible with the Model 1900 Trend Recorder/Printer.

Note 2: For optional pump transformer configuration, refer to pages B5/B6.

MODEL 845XT—IEC PARTS LIST

The illustrated parts breakdown listed on the following pages contains the parts identification for all models of the 845XT—IEC DINAMAP™. Refer to the Reference Configuration Code table below to identify the monitor model. The identifying letter is found in the "Ref Config" column on the parts list if the part number differs for different models.

Reference Configuration Code, Model 845XT—IEC

	A	B	C	D	E
	100V IEC	240V IEC	German	French	Dutch
Part No.	357-070	357-066	357-067	357-068	357-069
Cat. No.	084528	084524	084525	084526	084527

Item No.	Part No.	Description	Units per Assy.	Ref Config.
1	334-033	Cover Assembly — IEC 240V/50Hz, 100V/50Hz	1	A,B
	or			
	334-034	Cover Assembly — GERMAN	1	C
	or			
	334-035	Cover Assembly — DUTCH	1	E
	or			
	334-036	Cover Assembly — FRENCH	1	D
2	703-105	Cover	1	All
3	724-103	Washer, Lock Split Ring No. 8	4	All
4	727-101	Fastener, Snap Stud	4	All
5	715-109	Nut, Reg 8-32 SS	4	All
6	732-103 ✳	Handle with Hardware	1	All
7	729-523	Plate, Auto Mode Inst., 100V	2	A
	or			
	729-524	Plate, Auto Mode Inst. — GERMAN	2	C
	or			
	729-525	Plate, Auto Mode Inst. — DUTCH	2	E
	or			
	729-526	Plate, Auto Mode Inst. — FRENCH	2	D
8	729-135	Label, Danger Explosion Hazard	1	All
9	727-120	Rivet, Type N SSP-43	12	All
10	727-111	Rivet, Pop 1/8 Dia.	2	All
11	722-121	Screw, Flt-Hd 8-32 x 3/8	4	All
12	332-075	Front Panel and Quad Display Board Assy. — IEC	1	B
	or			
	332-092	Front Panel and Quad Display Board — GERMAN 240V/50Hz	1	C

MODEL 845XT—IEC PARTS LIST (Cont'd)

Item No.	Part No.	Description	Units per Assy.	Ref Config.
	or			
12	332-075	Front Panel and Quad Display Board — IEC 100V/50Hz	1	A
	or			
	332-093	Front Panel and Quad Display Board — DUTCH 240V/50Hz	1	E
	or			
	332-094	Front Panel and Quad Display Board — FRENCH 240V/50Hz	1	D
13	315-143	Quad Display Assembly	1	All
14	680-233	Wire, 18 AWG Stranded Grn/Yel, IEC	0.166 ft.	All
15	316-141	Power Switch Assy	1	All
16	734-112	Terminal, Gnd Lug Locking	1	All
17	716-101	Nut, Decorative 1/4 x 40 mm	10	All
18	733-102	Guard, Alarm Switch	1	All
19	320-179	Front Panel	1	A,B
	or			
	320,180	Front Panel, GERMAN	1	C
	or			
	320-181	Front Panel, DUTCH	1	E
	or			
	320-182	Front Panel, FRENCH	1	D
20	733-105	Lens, Red Filter	4	All
21	733-108	Bezel, Black	4	All
22	601-108	Ribbon Cable Assy., 16 Pin Dip 5 inch	1	All
23	601-109	Ribbon Cable Assy., 16 Pin Dip 7 inch	1	All
24	336-064	Chassis Assy., 240V	1	B,C,D,E
	or			
	336-065	Chassis Assy., 100V	1	A
25	702-130	Chassis IEC	1	All
26	752-108	Fuseholder Cap, 3AG Gray (for 120/100V units)	2	A
	or			
	752-109	Fuseholder Cap, FST Black (for 240V units)	2	B,C,D,E
27	617-104	Fuseholder with Hardware	2	All
28	628-103	Fuse, 0.5 amp 250V Slo-Blo (for 120/100V units)	2	A
	or			
	628-125	Fuse, 0.2 amp 250V Slo-Blo 5 x 20 mm FST (for 240V units)	2	B,C,D,E
29	618-106	Filter, 6A, 250V 0.15-20 MHz	1	All

MODEL 845XT—IEC PARTS LIST (Cont'd)

Item No.	Part No.	Description	Units per Assy.	Ref Config.
30	315-008	Power Supply Assembly	1	All
31	316-145	Power Connector 240V, 50 Hz	1	B,C,D,E
	316-144	Power Connector 100V, 50 Hz	1	A
32	330-016	Air Suppty Harness Assy. IEC		All
33	712-140	Connector, Bulkhead Chrome	2	All
34	716-102	Nut, Hex 7/16 Brass	2	All
35	736-112	Clamp, Plastic "C" 1 inch	1	All
36	736-107	Clip, Locking Adhesive Back	1	All
37	732-117	Plug, 3/8 Hole	1	All
38	704-140	Clip, Speaker Mounting	2	All
39	715-103	Nut, Hex 6-32 x 1/4 SS	6	All
40	320-016	Connector, Power Supply	1	All
41	721-101	Screw, Nylon 6-32 x 3/8	3	All
42	735-145	Standoff, Female Swivel	3	All
43	725-103	Washer, Nylon 0.150 ID, 5/16 OD	6	All
44	735-136	Spacer, Nylon Thread 6 x 3/4	2	All
45	735-132	Spacer, MF 1/4 x 2.5 w 6-32 thd	2	All
46	719-111	Screw, Mach Phil 6-32 x 3/8	5	All
47	300-552	Control Logic, PWA	1	All
	or			
	300-553	*See Note 1.*		
48	719-122	Screw, Mach, Pan Hd 10-32 x 1/2	4	All
49	723-105	Washer, Flat Std No. 10 SS	7	All
50	724-104	Washer, Lock Split Ring No. 10	4	All
51	320-193	Power Cable Assy. 100V/240V IEC	1	All
52	724-102	Washer, Lock Split Ring No. 6	6	All
53	715-107	Nut, Hex 4-40	4	All
54	724-101	Washer, Lock Split Ring No. 4	4	All
55	723-104	Washer, Flat No. 8	2	All
56	716-106	Nut, Self Locking No. 8	3	All
57	724-103	Washer, Lock Split Ring No. 8	3	All
58	732-113	Foot, 0.5 inch Bump-On	4	All

MODEL 845XT—IEC PARTS LIST (Cont'd)

Item No.	Part No.	Description	Units per Assy.	Ref. Config.
59	715-109	Nut, Hex 8-32 Std. Pattern	6	All
60	722-110	Screw, Sub — D Min. Conn.	2	All
61	320-014	Conn. Assy., Rear Panel	1	All
62	664-118	Switch, SPDT CNTR-OFF	1	All
63	630-103	Pot, 100K, 1 Turn	1	All
64	682-107	Cable Assy., 16 inch	1	All
65	734-114	Terminal, Gnd Lug Locking	1	All
66	600-102	Speaker 2 inch	1	All
67	722-120	Stud, 8-32 UNC 1-1/4 SS	3	All
68	320-175	Pump-Transformer Assembly IEC	1	All
69	320-194	Air Pump, 50 Hz	1	
70	320-176	Transformer Assembly	1	All
70A	315-139	Transformer PWA	1	B,C,D,E
71	704-350	Bracket, Flange Pump Mtg.	1	All
72	710-102	Mount, Barry Ball	3	All
73	735-134	Spacer, Threaded 1/4 x 1/4 w 6-32 thd	4	All
74	719-112	Screw, Pan Hd 8-32 x 3/8	5	All
75	724-103	Washer, Lock No. 8	4	All
76	724-104	Washer, Flat No. 8	4	All
77	715-109	Nut, Hex 8-32	5	All
78	719-130	Screw, Mach Pan Hd 6-32 x 1	4	All
79	724-102	Washer, Lock No. 6	4	All
80	715-103	Nut, Hex 6-32 x 1/4 SS	4	All
81	734-112	Terminal, Gnd Lug Locking	2	
82	680-130	Wire, White 18 AWG Stranded	0.180 ft.	All

Note 1: 300-552 contains software that makes the DINAMAP™ Monitor, Model 845XT—IEC, compatible with the Model 950 Trend Recorder/Printer.

300-553 contains software that makes the DINAMAP™ Monitor, Model 845XT—IEC, compatible with the Model 1900 Trend Recorder/Printer.

LIST OF ABBREVIATIONS (Signal Flow Diagrams)

Abbreviation	Definition
A0 through A15	Address Bits
ADD 1	Add 1 minute
ADD 2	Add 2 minutes
ADD 4	Add 4 minutes
ADD 8	Add 8 minutes
AD START	Analog Digital Start
ALARM-0	Limits Alarm
ALARMO EXT	Limits Alarm External
ANASEL-1	Analog Select
CLK	Clock
CLO	Clamp Circuit On
D0 through D7	Data Bits
DATAUP-1	Data Up
DIACNT-0	Diastolic Count
DIACLR-1	Diastolic Clear
DPDT	Delta Pressure/Delta Time
DPDTNEO	Delta Pressure/Delta Time Neonate
FSRSTO	Fail Safe Reset
HRCLR-1	Heart Rate Clear
HRCNT-0	Heart Rate Count
INPEN00	Input Port Enable 0
INPEN10	Input Port Enable 1
INTOSC1	Interrupt Oscillation
IORO	Input/Output Read
IOWO	Input/Output Write
MEMRO	Memory Read
MEMWO	Memory Write
MCLR-1	MAP Clear
MCNT-0	MAP Count
PRES-0	Cuff Pressure
PT	Pressure Transducer
PUMPON	Pump On
READY	Ready
RESET 0	Master Logic Reset
$\overline{\text{RESIN}}$	Reset In
RDYIN	Ready In
SYSCLR-1	Systolic Clear
SYSCNT-0	Systolic Count
SDATA1	Start Data
$\overline{\text{STSTB}}$	System Strobe
VABONO	Air Valve ON

CONTROL LOGIC ASSEMBLY, MODEL 845(A) PARTS LIST

Ref. Des.	Part No.	Description	Units per Assy.
	300-544 or 300-545	Control Logic Assembly 845(A) *See Note 1.*	
U2	622-103	IC, 8080 8 Bit Microprocessor	1
U4	620-123	IC, Bus Driver 8228DGTL	1
U1	620-122	IC, Clock Generator 8224DGTL	1
U5, 6	622-102	IC, 18 Pin MPS2114-45 RAM	2
U14	620-107	IC, Decoder 74LS154DGTL	1
U17-U22	62 . .-110	IC, FF 74LS175DGTL	6
U26, 27, 33	619-103	IC, 80C98 CMOS Hex Inv. Buffer	3
U13	620-103	IC, 74LS08DGTL AND gate	1
U15, 16	620-104	IC, 74LS42DGTL BCD/DEC	2
U3, 48	619-111	IC, 4049U CMOS Hex Inv. Buffer	2
U23-25	619-112	IC, 4050 CMOS Hex Non Inv. Buffer	3
U31, 32, 36-40	621-113	IC, 358 LIN OP — amp Dual	7
U35	621-122	IC, 725 LIN OP — amp Buffer	1
U51	621-139	IC, 7905 LIN -5V	1
U28, 29	619-110	IC, 4040 CMOS 12 Bit Bin Cntr	2
U42	621-115	IC, 380 LIN Audio amp	1
U41	621-117	IC, 555 LIN Timer	1
U30	621-124	IC, 816 LIN A/D Converter	1
U7-U10	*See Note 2*	IC, 2708 EPROM	4
(U7-10, 14)	607-168	Socket, 24 Pin Dip Low Profile	5
(U4)	607-169	Conn., 28 Pin Dip Low Profile	1
(U2, U30)	607-170	Socket, 40 Pin Dip Low Profile	2
(U5, U6)	607-185	Socket, 18 Pin Dip Low Profile	2
(J5, J6, U6,27,33)	607-178	Socket, 16 Pin Dip	3
X1	609-103	Crystal, 18.432 MHz	1

CONTROL LOGIC ASSEMBLY, MODEL 845(A) PARTS LIST (Cont'd)

Ref. Des.	Part No.	Description	Units per Assy.
Q4	676-102	Transistor, J-FET	1
Q3	674-102	Transistor, amp 2N4401	1
VR1	611-105	Diode, Voltage Ref. 1.2V	1
TX1	*See Note 3*	Transducer	1
CR1, 3-6, 12, 13	610-104	Diode, SN200MA 75V	7
CR7	612-107	Diode, Zener 6.2V 0.5W 5%	1
CR8, 9	612-108	Diode, Zener 7.5V 0.5W 5%	2
CR10, 11	612-109	Diode, Zener 9.1V 0.5W 5%	2
R7	652-158	Res., MF 499 ohm 1/8W 1%	1
R13	652-138	Res., MF 2.49K 1/8W 1%	
R41	652-159	Res., MF 4.99K 1/8W 1%	1
R2, 3, 23,24, 52, 82-85	652-106	Res., MF 10.2K 1/8W 1%	9
R8, 12	652-165	Res., MF 665 ohm 1/8W 1%	2
R66	652-117	Res., MF 14.3K 1/8W 1%	1
R70	652-125	Res., MF 1.82 1/8W 1%	1
R27	652-126	Res., MF 18.2K 1/8W 1%	1
R9	652-171	Res., MF 8.25K 1/8W 1%	1
R31	652-132	Res., MF 22.1K 1/8W 1%	1
R30, 39, 86-88	652-150	Res., MF 33.2K 1/8W 1%	5
R10, 64 65, 67, 68	652-139	Res., MF 24.9K 1%	5
R62	652-157	Res., MF 48.7K 1/8W 1%	1
R61	652-167	Res., MF 7.50K 1/8W 1%	1
R34	652-103	Res., MF 100K 1/8W 1%	1
R19, 40	652-122	Res., MF 169K 1/8W 1%	2
R32	652-140	Res., MF 255K 1%	1
R14	*See Note 3*	Res., MF 20.5K 1/8W 1%	1
(Select one)	*See Note 3*	Res., MF 28.7K 1/8W 1%	1
	See Note 3	Res., MF 13.3K 1/8W 1%	

CONTROL LOGIC ASSEMBLY, MODEL 845(A) PARTS LIST (Cont'd)

Ref. Des.	Part No.	Description	Units per Assy.
R16	652-119	Res., MF 15K 1/8W 1%	1
(Select one)	652-171	Res., MF 8.25K 1/8W 1%	
R69	650-125	Res., 200 ohm 1/4W 5%	1
R4, 5	652-153	Res., MF 348K 1/8W 1%	2
R51	650-141	Res., CF 2.7 ohm 1/4W 5%	1
R47	655-104	Res., WW 7.50 ohm 3W 5%	1
R6, 76, 77	650-149	Res., CF 33 ohm 1/4W 5%	3
R78, 79	650-156	Res., CF 470 ohm 1/4W 5%	2
R49,54, 55,81, 90,96	650-102	Res., CF 1K 1/4W 5%	6
R44,74, 94,95 97-107, 121,122	650-157	Res., CF 4.7K 1/4W 5%	17
R37	650-174	Res., CF 6.8K 1/4W 5%	1
R25	650-179	Res., CF 8.2K 1/4W 5%	1
R38, 56, 57, 91	650-182	Res., CF 9.1K 1/4W 5%	4
R1, 26, 53, 58, 59, 92, 93	650-103	Res., CF 10K 1/4W 5%	7
R29, 60	650-112	Res., CF 12K 1/4W 5%	2
R21, 36, 43	650-184	Res., CF 15K 1/4W 5%	3
R48	650-127	Res., CF 20K 1/4W 5%	1
TP1-13	734-103	Terminal, Turret	13
R35	650-158	Res., CF 47K 1/4W 5%	1
R28	650-162	Res., CF 51K 1/4W 5%	1
R45	652-162	Res., MF 56K 1/4W 5%	1
R46	652-164	Res., MF 62K 1/4W 5%	1
R89	650-104	Res., CF 100K 1/4W 5%	1
R80	650-119	Res., CF 150K 1/4W 5%	1
R20, 22	650-124	Res., CF 180K 1/4W 5%	2

CONTROL LOGIC ASSEMBLY, MODEL 845(A) PARTS LIST (Cont'd)

Ref. Des.	Part No.	Description	Units per Assy.
R17-18, 73	650-132	Res., CF 220K 1/4W 5%	3
R50	650-130	Res., CF 2.2K 1/4W 5%	1
R11	630-123	Trimpot, 2K 3/4W 10% 20 TURN	1
R15, 33, 42, 63	630-109	Trimpot, 10K 3/4W 10% 20 TURN	4
C1	603-119	Cap., Polyester .022 μF 100V 10%	1
C2, 8, 9 30-33	603-103	Cap., .22 μF 15V 20%	7
C3-5, 13-15, 17, 19-20, 22-25, 36-40, 42, 43, 46, 48, 51, 54	602-107	Cap., CF .1 μF 50V 20%	27
C44, 45	603-113	Cap., Polyester 0.1 μF 100V 5%	2
C49, 50	602-106	Cap., CF 1μF 50V 20%	2
C6	603-114	Cap., Polyester 0.1 μF 100V 5%	1
C7	602-113	Cap., Mica 200 pF 100V 5%	1
C29	603-118	Cap., Polyester 0.0022 μF 100V 5%	1
C10-12, 34, 35, 41	602-117	Cap., Ceramic 0.01 μF 50V 10%	6
C16, 18, 35	604-110	Cap., Elect., 200μF 40V	3
C21, 27	603-105	Cap., Tantalum 4.7 μF 20V 20%	2
C28	602-109	Cap., Mica 10 pF 500V 5%	1
R108-120	650-101	Res., CF 100 ohm 1/4W 5%	13
	656-103	Res., Network 9-4.7K	1
	608-111	Cont, Pin 18-24 AWG	7
P10	607-196	Connector, 9 Cont Pin Housing	1
	722-113	Screw, Pan Hd 1/4 Self Tap	2
	732-113	Foot, 0.5 inch Bump-On	1

CONTROL LOGIC ASSEMBLY, MODEL 845(A) PARTS LIST (Cont'd)

Ref. Des.	Part No.	Description	Units per Assy.
J8	607-147	Connector, Lock/Eject Header	1
	736-116	Clip, 3/8 inch Plastic	1
	736-112	Clamp, "C" Type Plastic 1 inch wide	2
	736-107	Clip, Locking Adhesive Back	2

Note 1: 300-544 and 300-548 contain software compatible with the Model 950 Trend Recorder/Printer.

300-545 and 300-549 contain software compatible with the Model 1900 Trend Recorder/Printer.

Note 2: 365-010, set of EPROMs, contains software that makes the Model 845(A) compatible with the Model 950 Trend Recorder/Printer.

365-022, set of EPROMS, contains software that makes the Model 845(A) compatible with the Model 1900 Trend Recorder/Printer.

365-012, set of EPROMS, contains software that makes the Model 845XT compatible with the Model 950 Trend Recorder/Printer.

365-026, set of EPROMS, contains software that makes the Model 845XT compatible with the Model 1900 Trend Recorder/Printer.

Note 3: The components must be installed by authorized Critikon personnel.

CONTROL LOGIC ASSEMBLY, MODEL 845XT or 845XT—IEC PARTS LIST

Ref. Des.	Part No.	Description	Units per Assy.
	300-552 or 300-553	Control Logic Assembly 845XT—IEC, 845XT, and 845A *See Note 1.*	1
PWB		PWB, Control Logic	1
U2	622-103	IC, 8080 8 Bit Microprocessor	1
U4	620-123	IC, Bus Driver 8228DGTL	1
U1	620-122	IC, Clock Generator 8224DGTL	1
U5, 6	622-102	IC, 18 Pin MPS2114-45 RAM	2
U14	620-107	IC, Decoder 74LS154DGTL	1
U17-U22	620-110	IC, FF 74LS175DGTL	6
U26, 27 33	619-103	IC, 8OC98 CMOS Hex Inv. Buffer	3
U13	620-103	IC, 74LS08DGTL AND gate	1
U15, 16	620-104	IC, 74LS42DGTL BCD/DEC	2
U3, 48	619-111	IC, 4049U CMOS Hex Inv. Buffer	2
U23-25	619-112	IC, 4050 CMOS Hex Non Inv. Buffer	3
U31, 32, 36-40	621-113	IC, 358 LIN OP-amp Dual	7
U35	621-122	IC, 725 LIN OP-amp Buffer	1
U51	621-139	IC, 7905 LIN -5V	1
U28, 29	619-110	IC, 404 CMOS 12 Bit Bin Cntr	2
U42	621-115	IC, 380 LIN Audio amp	1
U41	621-117	IC, 555 LIN Timer	1
U30	621-124	IC, 816 LIN A/D Converter	1
U7-U10	*See Note 2.*	IC, 2708 EPROM	4
(U7-10)	607-168	Socket, 24 Pin Dip Low Profile	4
(U4)	607-169	Conn., 28 Pin Dip Low Profile	1
(U2, U30)	607-170	Socket, 40 Pin Dip Low Profile	2
(U5, U6)	607-185	Socket, 18 Pin Dip Low Profile	2
(J27, 28, 33)	607-178	Socket, 16 Pin Dip	3
X1	609-103	Crystal, 18.432 MHz	1
Q4	676-102	Transistor, J-FET	1

CONTROL LOGIC ASSEMBLY, MODEL 845XT or XT—IEC PARTS LIST (Cont'd)

Ref. Des.	Part No.	Description	Units per Assy.
Q3	674-102	Transistor, amp 2N4401	1
VR1	611-105	Diode, Voltage Ref. 1.2V	1
TX1	*See Note 3.*	Transducer	1
CR1, 3-6, 12, 13	610-104	Diode, SN200MA 75V	7
CR7	612-107	Diode, Zener 6.2V 0.5W 5%	1
CR8, 9	612-108	Diode, Zener 7.5V 0.5W 5%	2
CR10, 11	612-109	Diode, Zener 9.1V 0.5W 5%	2
R7	652-158	Res., MF 499 ohm 1/8W 1%	1
R13	652-138	Res., MF 2.49K 1/8W 1%	
R41	652-159	Res., MF 4.99K 1/8W 1%	1
R2, 3, 23, 24, 52, 82-85	652-106	Res., MF 10.2K 1/8W 1%	9
R8, 12	652-165	Res., MF 665 ohm 1/8W 1%	2
R66	652-117	Res., MF 14.3K 1/8W 1%	1
R70	652-125	Res., MF 1.82 1/8W 1%	1
R27	652-126	Res., MF 18.2K 1/8W 1%	1
R9	652-171	Res., MF 8.25K 1/8W 1%	1
R31	652-132	Res., MF 22.1K 1/8W 1%	1
R30, 39, 86-88	652-150	Res., MF 33.2K 1/8W 1%	5
R10, 64 65, 67, 68	652-139	Res., MF 24.9K 1%	5
R62	652-157	Res., MF 48.7K 1/8W 1%	1
R61	652-167	Res., MF 7.50K 1/8W 1%	1
R34	652-103	Res., MF 100K 1/8W 1%	1
R19, 40	652-122	Res., MF 169K 1/8W 1%	2
R32	652-140	Res., MF 255K 1%	1
R14	*See Note 3*	Res., MF 20.5K 1/8W 1%	1
(Select one)	*See Note 3*	Res., MF 28.7K 1/8W 1%	1
	See Note 3	Res., MF 13.3K 1/8W 1%	
R16	652-119	Res., MF 15K 1/8W 1%	1

CONTROL LOGIC ASSEMBLY, MODEL 845XT or XT—IEC PARTS LIST (Cont'd)

Ref. Des.	Part No.	Description	Units per Assy.
(Select one)	652-171	Res., MF 8.25K 1/8W 1%	
R69	650-125	Res., 200 ohm 1/4W 5%	1
R4, 5	652-153	Res., MF 348K 1/8W 1%	2
R51	650-141	Res., CF 2.7 ohm 1/4W 5%	1
R47	655-104	Res., WW 7.5 ohm 3W 5%	1
R6, 76, 77	650-149	Res., CF 33 ohm 1/4W 5%	3
R78, 79	650-156	Res., CF 470 ohm 1/4W 5%	2
R49, 54, 55, 81, 90, 96	650-102	Res., CF 1K 1/4W 5%	6
R44, 74, 94, 95 97-107, 121, 122	650-157	Res., CF 4.7K 1/4W 5%	17
R37	650-174	Res., CF 6.8K 1/4W 5%	1
R25	650-179	Res., CF 8.2K 1/4W 5%	1
R38, 56, 57, 91	650-182	Res., CF 9.1K 1/4W 5%	4
R1, 26 53, 58, 59, 92, 93	650-103	Res., CF 10K 1/4W 5%	7
R29, 60	650-112	Res., CF 12K 1/4W 5%	2
R21, 36, 43	650-184	Res., CF 15K 1/4W 5%	3
R48	650-127	Res., CF 20K 1/4W 5%	1
TP1-13	734-103	Terminal, Turret	13
R35	650-158	Res., CF 47K 1/4W 5%	1
R28	650-162	Res., CF 51K 1/4W 5%	1
R45	652-162	Res., MF 56K 1/4W 5%	1
R46	652-164	Res., MF 62K 1/4W 5%	1
R89	650-104	Res., CF 100K 1/4W 5%	1
R80	650-119	Res., CF 150K 1/4W 5%	1
R20, 22	650-124	Res., CF 180K 1/4W 5%	2
R17-18, 73	650-132	Res., CF 220K 1/4W 5%	3

CONTROL LOGIC ASSEMBLY, MODEL 845XT or XT—IEC PARTS LIST (Cont'd)

Ref. Des.	Part No.	Description	Units per Assy.
R50	650-130	Res., CF 2.2K 1/4W 5%	1
R11	630-123	Trimpot, 2K 3/4W 10% 20 TURN	1
R15, 33, 42, 63	630-109	Trimpot, 10K 3/4W 10% 20 TURN	4
C1	630-119	Cap., Polyester 0.022 μF 100V 10%	1
C2, 8, 9, 30-33	603-103	Cap., 0.22 μF 15V 20%	7
C3-5, 13-15, 17, 19-20 22-25, 36-40, 42, 43, 46, 48, 51, 54	602-107	Cap., CF 0.1 μF 50V 20%	27
C44, 45	603-113	Cap., Polyester 0.1 μF 100V 5%	2
C49, 50	602-106	Cap., CF 1 μF 50V 20%	2
C6	603-114	Cap., Polyester 0.1 μF 100V 5%	1
C7	602-113	Cap., Mica 200 pF 100V 5%	1
C29	603-118	Cap., Polyester 0.0022 μF 100V 5%	1
C10-12, 34, 35, 41	602-117	Cap., Ceramic 0.01 μF 50V 10%	6
C16, 18, 35	604-110	Cap., Elect., 200 μF 40V	3
C21, 27	603-105	Cap., Tantalum 4.7 μF 20V 20%	2
C28	602-109	Cap., Mica 10 pF 500V 5%	1
R108-120	650-101	Res., CF 100 ohm 1/4W 5%	13
	656-103	Res., Network 9-4.7K	1
	608-111	Cont, Pin 18-24 AWG	7
P10	607-196	Connector, 9 Cont Pin Housing	1
	722-113	Screw, Pan Hd 1/4 Self Tap	2
	732-113	Foot, 0.5 inch Bump-On	1
J8	607-147	Connector, Lock/Eject Header	1

CONTROL LOGIC ASSEMBLY, MODEL 845XT or XT—IEC PARTS LIST (Cont'd)

Ref. Des.	Part No.	Description	Units per Assy.
	736-116	Clip, 3/8 inch Plastic	1
	736-112	Clamp, "C" Type Plastic 1 inch wide	2
	736-107	Clip, Locking Adhesive Back	2

Note 1: 300-552 contains software compatible with the Model 950 Trend Recorder/Printer.

300-553 contains software compatible with the Model 1900 Trend Recorder/Printer.

Note 2: 365-012, set of EPROMs, contains software that makes the Model 845XT or Model 845XT—IEC compatible with the Model 950 Trend Recorder/Printer.

365-026, set of EPROMs, contains software that makes the Model 845XT or Model 845XT—IEC compatible with the Model 1900 Trend Recorder/Printer.

Note 3: Component(s) must be installed by authorized Critikon personnel.

QUAD DISPLAY ASSEMBLY, MODEL 845(A) PARTS LIST

Ref. Des.	Part No.	Description	Units per Assy.
	315-017 or 315-067	Quad Display Assembly	1
U1x4	619-119	IC, MC14553 16 Pin	4
U2x4	620-119	IC, DM74LS47N TTL 16 Pin	4
U3,4,5 x4	614-106	LED, Display	12
U6	621-117	IC, LM555CN Timer 8 Pin	1
U7	619-110	IC, MC14040CP 14 Pin	1
U8	619-111	IC, MC14049BCP 16 Pin	1
U9	619-109	IC, 4027	1
U10	619-106	IC, MC14011 14 Pin	1
U11	620-115	IC, 7404 14 Pin	1
Q1,2,3	674-103	Transistor, 2N4403	12
Q4-6, 8, 12	674-102	Transistor, 2N4401	8
Q7	675-102	Transistor, 2N6346A 600V	1
CR2,3	610-103	Diode, Power 1N4004 400V	2
CR4	614-103	LED, NLS5086 Red	1
CR5,6	614-104	LED, Yellow	2
CR7	612-108	Diode, Zener 7.5V .5W 5%	1
CR9	610-104	Diode, Power IN4148	1
S3-5, 7,8	664-115	Switch, SPDT	5
S1,2	664-124	Switch, U21P4HCQ	2
S6,9	664-116	Switch SPDT	2
C1	603-106	Cap., Film 0.001 μF 100V 5%	4
C6,13, 14	603-109	Cap., Film 0.01 μF 100V 5%	3
C2,4, 7,8,11	603-113	Cap., Film 0.1 μF 100V 5%	5
C10	603-111	Cap., Film 0.1 μF 250V 5%	
C3,5,12	604-109	Cap., Elect 22 μF 25V	3
R22	650-101	Res., CF 100 ohm 1/4W 5%	1
R6-12	650-110	Res., CF 120 ohm 1/4W 5%	28

QUAD DISPLAY ASSEMBLY, MODEL 845(A) PARTS LIST (Cont'd)

Ref. Des.	Part No.	Description	Units per Assy.
R13,37-39	650-122	Res., CF 180 ohm 1/4W 5%	7
R19,31	650-128	Res., CF 220 ohm 1/4W 5%	2
R1-3,40	650-156	Res., CF 470 ohm 1/4W 5%	13
R23	650-173	Res., CF 680 ohm 1/4W 5%	1
R20,21,24, 25,33-36	650-102	Res., CF 1K ohm 1/4W 5%	8
R4,5	650-157	Res., CF 4.7K ohm 1/4W 5%	8
R18,26,27, 29,30,32	650-103	Res., CF 10K 1/4W 5%	6
R14,15	650-159	Res., CF 470K ohm 1/4W 5%	2
R28	650-105	Res., CF 1M ohm 1/4W 5%	1
R17	650-120	Res., CF 1.5M ohm 1/4W 5%	1
R16	650-148	Res., CF 3.3M ohm 1/4W 5%	1
J4,5,6	607-108	Conn, 3 pin female Hdr Amp	3
J3	607-197	Conn, 9 pin female Hdr Amp	1
(U3,4,5)	607-177	Socket, Dip 14 Pin	12
(J1,2)	607-167	Socket, Dip 16 Pin Low Profile	2
	719-107	Screw, Mach Pan Hd pHH 6-32 x 5/16	1
	724-107	Washer, Lock I. T. #6 SS	1
	715-103	Nut, Hex 6-32 Small Pattern	1
	756-105	Tyrap, Large, 1.250 BDL DIA.	4
V1	320-011	Air Valve	1
	735-123	Spacer, Nylon, .148, .085, .080L	3
OPS-1	320-010	Overpressure Switch Assy.	1
K1	648-104	Relay, Reed 0.15LS	1
	734-112	Terminal, Gnd Lug Locking	1
	752-117	Shield, Protective A.C.	1
	723-107	Washer, Flat Sm Patt #6	1

QUAD DISPLAY ASSEMBLY, MODEL 845XT—IEC PARTS LIST

Ref. Des.	Part No.	Description	Units per Assy.
	315-143	Quad Display Assembly IEC	1
U1x4	619-119	IC, MC14553 16 Pin	4
U2x4	620-119	IC, DM74LS47N TTL 16 Pin	4
U3,4,5 x4	614-106	LED, Display	12
U6	621-117	IC, LM555CN Timer 8 Pin	1
U7	619-110	IC, MC14040CP 14 Pin	1
U8	619-111	IC, MC14049BCP 16 Pin	1
U10	619-106	IC, MC14011 14 Pin	1
U11	620-115	IC, 7404 14 Pin	1
Q1,2,3 x4	674-103	Transistor, 2N4403	12
Q4-6,12, 13	674-102	Transistor, 2N4401	5
CR3,10, 11	610-103	Diode, Power 1N4004 400V	3
CR4	614-103	LED, NLS5086 Red	1
S3-5, 7,8,10	664-115	Switch, SPDT	6
S2	664-114	Switch U21P4HCQ	1
S6,9	664-116	Switch SPDT	2
C1x4	603-106	Cap., Film 0.001 μF 100V 5%	4
C6, 13	603-109	Cap., Film 0.01 μF 100V 5%	2
C2,4, 7,8,11	603-113	Cap., Film 0.1 μF 100V 5%	5
C3,5,12	604-109	Cap., Elect 22 μF 25V	3
S11	654-127	Switch, SPST, PC Mount	1
R6-9x4 10-12x4	650-110	Res., CF 120 ohm 1/4W 5%	28
R13x4 R37-39	650-122	Res., CF 180 ohm 1/4W 5%	7
R19, 31	650-128	Res., CF 220 ohm 1/4W 5%	2
R1-3x4, 40	650-156	Res., CF 470 ohm 1/4W 5%	13
R24, 25 36, 41, 42	650-102	Res., CF 1K ohm 1/4W 5%	5

QUAD DISPLAY ASSEMBLY, MODEL 845XT—IEC PARTS LIST (Cont'd)

Ref. Des.	Part No.	Description	Units per Assy.
R4, 5 x4	650-157	Res., CF 4.7K ohm 1/4W 5%	8
R18, 32	650-103	Res., CF 10K ohm 1/4W 5%	2
R14, 15	650-159	Res., CF 470K ohm 1/4W 5%	2
R17	650-120	Res., CF 1.5M ohm 1/4W 5%	1
R16	650-148	Res., CF 3.3M ohm 1/4W 5%	1
(U3, 4, 5x4)	607-177	Socket, Dip 14 Pin	12
(U9)	607-167	Socket, Dip 16 Pin Low Profile	1
	719-107	Screw, Mach Pin Hd 6-32 x 5/16	1
	724-107	Washer, Lock I.T. No. 6 SS	1
	715-103	Nut, Hex 6-32 Small Pattern	1
	756-105	Tyrap, Large	4
V1	320-011	Air Valve	1
	735-123	Spacer, Nylon	3
CR5,6	614-104	LED, Yellow	2
CR7	612-108	Diode, Zener 7.5V	1
	734-112	Terminal, Gnd Lug Locking	1
	752-117	Shield, Protective A.C.	1
CR9	610-104	Diode, Power IN4148	1
J1,J2	607-260	Socket, 16 Pin Dip Lock & Eject	2

TRANSFORMER PWA ASSEMBLY, MODEL 845XT—IEC
PARTS LIST

Ref. Des.	Part No.	Description	Units per Assy.
	315-139	Transformer Board Assembly	1
K1	448-105	Relay, Solid State	1
S1	662-134	Switch, Pressure	1
C1	603-111	Cap., Poly 0.1 μF 250V 5%	1
R1	650-173	Res., CF 680 ohm 1/4W 5%	1
R2	655-107	Res., 10K ohm 10W 5%	1
J1	607-112	Conn 4 Cont Pin	1
	734-131	Terminal Recp 0.182 x 0.020 inch	2
	734-116	Terminal Male amp 0.250 x 0.032 inch	2

POWER SUPPLY ASSEMBLY PARTS LIST

Ref. Des.	Part No.	Description	Units per Assy.
	315-008	Power Supply Assembly	1
	734-102	Terminal, Turret	6
U1,11,21	621-105	IC, LM205	3
U30	621-113	IC, LM358AN 8 Pin	1
Q1,11,21	673-103	Transistor, MJE3055	3
Q2,12,22	674-103	Transistor, 2N4403	3
Q30,31	676-102	Transistor, MPF971	2
CR1-6, 11,16	611-103	Diode, Power GE531	19
CR21-26, 30	611-103	Diode, Power GE531	
C1,2	604-116	Cap., Elect., 4700 μF 16V	2
C11,21	604-112	Cap., Elect., 2200 μF 35V	2
C4	604-115	Cap., Elect., 470 μF 25V	1
C14,24, 30	604-109	Cap., Elect., 22μF 25V	3
C3,13,23	603-109	Cap. Film 0.01 μF 100V 5%	3
C5,7,8, 15,17,18	603-113	Cap. Film 0.1 μF 100V 5%	10
C25,27, 28,31	603-113	Cap. Film 0.1 μF 100V 5%	
R1	655-102	Res., WW 0.16 ohm 3W	1
R11,21	655-103	Res., WW 0.48 ohm 3W	2
R5	652-165	Res., MF 665 ohm 1/8W 1%	1
R15,25	652-116	Res., MF 1.40K 1/8W 1%	2
R3	652-120	Res., MF 1.65K 1/8W 1%	1
R13,23 33	652-111	Res., MF 12.1K 1/8W 1%	3
R32	652-119	Res., MF 15K 1/8W 1%	1
R2,12,22	650-177	Res., CF 68 ohm 1/4W 5%	3
R31	650-104	Res., CF 100K ohm 1/4W 5%	1
R30	650-105	Res., CF 1M ohm 1/4W 5%	1

POWER SUPPLY ASSEMBLY PARTS LIST (Cont'd)

Ref. Des.	Part No.	Description	Units per Assy.
R4,14,24	630-108	Trimpot, 1K ohm 3/4 IN. 10%	3
	704-142	Heatsink, Power Supply	1
	719-107	Screw, Mach Pan Hd 6-32 x 5/16	3
	752-112	Insulator, Washer	3
	726-101	Washer, Cup Compression	3

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